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ABSTRACT

This set of curriculum materials is a remedial, self-paced occupational mathematics program for educationally disadvantaged students. Experienced shop instructors worked with a mathematics consultant to develop and refine materials designed in a prior project. The curriculum package titled Math-PAC is comprised of a teacher management system and remedial instructional units related to five occupational areas: transportation, health occupations, building trades, mechanics, and personal services. Each instructional unit includes individual worksheets which develop mathematics skills needed in the occupational area. Math-PAC is self-paced and designed to be used with a class of 10 students in 2- or 3-hour periods. Students work individually completing one or more worksheets at each session, and leave the program when they have developed adequate competencies. The introductory section describes the development of the materials and comments briefly on each unit. Pre- and posttests are described and presented, and form letters to parents and home schools are presented. Classroom environment, floor plan and equipment, and teaching techniques are briefly discussed. Then the lessons and worksheets are presented. (MNS)

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M A T H - P A C

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the Salem County Vocational Technical Schools.

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This project reported herein was conducted pursuant to a contract from the New Jersey Department of Education, Division of Vocational Education and Career Preparation. It was funded under Section 133 of Public Law 94-482. The contractors undertaking this project were encouraged to express fully their judgments in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official funding agency position or policies.

In accordance with New Jersey Public Law 1975, Chapter 127, Salem County Vo-Tech Schools is guided by and complies with affirmative action laws and regulations as set forth by the State of New Jersey and the U.S. Federal Government.

MATH - PAC

The Math-PAC project was designed to refine and disseminate a remedial, self-paced occupational mathematics program for educationally disadvantaged students.

PROCEDURES

Experienced shop instructors worked with a mathematics consultant to further develop and refine materials designed in a prior project. These individualized, occupationally related materials, during a two-year field test period, had improved the mathematics skills of participating vocational students. Using documentation from the earlier project, the shop instructors developed a curriculum package, titled "Math-PAC," comprised of a teacher management system and remedial instructional units related to five occupational areas: transportation, health occupations, building trades, mechanics and personal services. Each instructional unit includes individual work sheets which will allow students to function in a particular occupational area. Math-PAC is self-paced and designed to be used with a class of 10 students in two- or three-hour periods. Students work individually completing one or more worksheets at each session, and leave the program when they have developed adequate competencies. Competency is assessed by student performance on the skill sheets and a final test.

CONTRIBUTION TO EDUCATION

During the two-year field-test period, Math-PAC proved to be a viable curriculum for shared-time vocational education students in need of mathematics remediation: 250 students completed the program successfully. Copies of the curriculum may be obtained through the New Jersey Vocational-Technical Curriculum Laboratory.

PROJECT NUMBER: 80 133 SCDG 848

SALEM COUNTY VOCATIONAL TECHNICAL SCHOOLS

MATH-PAC
CURRICULUM AND MANAGEMENT PROJECT

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SELF-PACED CURRICULUM COMPONENTS

Building Trades Occupations.....Pink.....	1 - 50
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OCCUPATIONAL MATHEMATICS

Occupational Math is a program designed to provide disadvantaged students enrolled in shared-time vocational programs with an opportunity to achieve success in their chosen occupational field. Effective vocational education requires that students have a working knowledge of basic mathematical skills to succeed in school and on the job.

Four years ago a need was voiced by members of Salem County Vo-Tech School General Advisory Board. This need was brought to the attention of school officials through members of the General Advisory Board who stated that graduates were having trouble passing the basic employment examinations at DuPont and other companies in the Salem area as was stated by Mr. Ford, Personnel Manager of DuPont Chambers Works. Following Mr. Ford's presentation four other major companies in the Salem area were contacted and their employment procedures were reviewed. It became evident that basic mathematics were required for employment in many of the vocational technical occupations. It was found that students graduating from the Salem County Vocational Technical Schools were lacking in computational skills. A review of program objectives indicated that more emphasis was necessary on basic skills. A test was developed to analyze the particular areas of weaknesses. In the school year 1974-75, all shared-time students who attended the Salem County Vocational Technical Schools were given a test to evaluate their skills in basic mathematics; addition, subtraction, multi-

plication, percentage, ratio and proportion, and division. It was noted that over 50% of the students did not possess skills necessary to effectively master their occupational programs.

The following school year funds were requested for a related instructor. Due to budgetary restrictions this position was not filled. However, the pre-test was given again to the incoming class. It was again noted that minimal improvement was made. Increased emphasis was placed in the instructional area for all programs in order that more mathematics was given as a part of the curriculum. It was found that mathematics education is not generally effectively taught by tradespeople who are experts in a given field.

The following year, in 1977-78, a pilot program was developed and funded by the Division of Vocational Education and Career Preparation. Educational research was implemented to determine whether or not similar programs were being utilized in other vocational-technical schools throughout the United States. The pilot program was developed after working with sending district math chairpersons, guidance personnel and the office of the County Superintendent. In addition, educational research through the computer at the educational testing service revealed a study by Penn State University Department of Vocational Education in April of 73. The study was based on a questionnaire sent to all secondary vocational teachers in Pennsylvania. The questionnaire asked teachers to respond to the importance of 66 basic math skills which were required for success in Vo-Tech

programs. The 3404 responses indicated that remediation in all basic math skills was needed. The occupational math program at Salem County Vocational Schools emphasizes the hands-on learning techniques to teach basic mathematics through individualized instruction which is self-paced and taught in shop type atmosphere.

The pilot program pinpointed 160 students who scored less than 50% on the pre-test. 80 were served, while 80 with similar scores were in a control group. During six weeks of instruction, for a total of only fifteen hours, those students who participated in the program achieved an average of 47% improvement on their scores while those who did not participate in the program increased by less than 7%.

Many inherent problems were encountered in the first six-week pilot. Being a shared-time vocational school, scheduling of activities around the Occupational Math class, which was designed at that time to meet every other day for 45 minutes, became a serious problem. Interruptions in clinical affiliations, lecture demonstrations, hands-on live work procedures in the shop, and a general loss of time to transfer students from one shop to another, were problems that had to be addressed.

During the summer of 1978 a math consultant, program coordinator and five instructors, one in each occupational cluster, worked together to develop self-paced curriculum which emphasized hands-on learning through the utilization of integrated worksheets and individualized instruction, all tied to the knowledge and skills necessary to succeed in

that occupational cluster.

The program was initiated full scale during the school year 78-79. With the various skill sheets, related instructional material, basic skills components and integration into the shop curriculum the program began with 100 students. Ten students to a class, two hour and forty-five minute sessions, one day a week. Consistent scheduling and planning allowed all instructors in the shop programs to plan around the loss of several students one day a week who would be attending the Occupational Math program. The two hour and forty-five minute session allowed students to complete one or more task sheets with individual attention by the instructor in a class size of 10. The environment of the class was more of a shop environment than an academic environment. Work benches, hand tools, equipment and supplies similar to what would be used in the particular shop were provided for students in order that they would be familiar with the need for math to succeed in their program. During the first year of operation 180 students were served. Of the 180 students served, 100 completed the program successfully, increasing their scores on the post-test to the 70% level of achievement. Students were placed in the program for a minimum of six weeks. From that point on they were individually evaluated and graduated from the program as competency developed.

The instructional personnel at the Salem County Vocational Technical Schools were thoroughly involved in the entire development of the program. Not only the five instructors who represented the occupational clusters, but all in-

structional staff were kept aware of the progress of the program and of their individual students through contact by the instructors in the Occupational Math program. Those contacts took the form of semimonthly and monthly feedback regarding how students were doing in the program. Student attendance was monitored closely along with their shop grades.

Micrometers, depth gauges, and other delicate instruments, which are capable of measurements to the ten-thousandth of an inch were used. Key elements of success were cooperation and the heavy emphasis placed on math related to each cluster. Students in the Auto Body program are constantly utilizing basic math, addition, subtraction, multiplication, and fractions. A typical example is frame alignment. Students must have a basic understanding of math to interpret manufacturer's specifications.

Students in the service cluster are constantly utilizing ratio and proportion in the mixing of various formulas. Cosmetology, Baking and Foods students are changing ratio and proportion to increase or decrease the size of specific recipes along with measuring ingredients, by both volume and liquid measure.

Building trade students are constantly called upon to estimate. Estimate the cost of a building, board feet of lumber, yards of concrete, all basic measures which are basic requirements of skilled craftpeople. The Occupational Math program emphasized the use of rulers. The basic formulas to establish volume, basic addition, subtraction and

multiplication, to calculate estimated cost for materials be it lumber, bricks or cement.

The Occupational Math program relies heavily on the ability to meet students at the point where their knowledge needs to be improved in order for them to succeed in the program and on the job.

Students in the Electrical Program need mathematics to calculate basic series parallel circuits, to utilize Ohm's Law effectively, to do basic load estimates on both commercial and residential electrical systems. The Occupational Math Program allows these individuals a chance to gain that knowledge in a directly related fashion.

Students in the Health Arts cluster are constantly involved with monitoring patient vital signs, handling billing operations for doctors, monitoring EKG machines, filling out forms and other data, which require basic mathematics. As part of the Occupational Math program students in the health occupations cluster work with a medical office billing system which related directly to their curriculum. The system allows students to improve their skills in addition, subtraction, multiplication and division.

Plumbing students who need Occupational Math find it difficult to understand inside diameter, outside diameter, wall thickness, number of threads per inch, overall size. These components are emphasized through the skill-sheets and worksheets.

What has Occupational Math done for students at Salem County Vocational Technical Schools? It has helped to build

self-concepts. It has helped to provide students with the tools necessary to be a success without having to feel inferior in a peer group where lack of understanding of basic math skills tends to depress the student's achievement ability and self-concept. If education is to serve the need of individuals then programs must be designed to work with individuals.

The Occupational Math program may not be needed some day. There may not be any educationally disadvantaged students some day. Salem County Vocational Technical Schools will continually assess the need for all of its programs; including related programs which are of vital importance to the success of its students in the world of work. Employment for all graduates is the primary goal.

Gene Bottoms, Executive Director of AVA, in the AVA special report dated February 1980, stated "the lack of basic computation skills is the most serious barrier between young people and successful entry into the labor market."

Four years ago this was recognized at Salem County Vocational Schools and through the help of the New Jersey State Department of Vocational Education and Career Preparation, funds were received during school year 78-79 to implement a program to do something. But more than that, to provide a model, a model which could be utilized for other shared-time vocational schools having similar problem. The model cost money to implement but it provides youth with the knowledge and skills necessary to succeed in the world of work.

Vocational Technical Education is addressing this need through an Occupational Math program which individualizes instruction, removes the student from the peer group and provides motivation which allows the student to move at his/her own pace in a hands-on oriented individualized environment. The rest will be up to you. To evaluate and assess the needs of your district. The program has been made possible through cooperation between business, industry and education and funding and technical assistance by the New Jersey State Department of Vocational Education and Career Preparation.

PRE-TEST AND POST-TEST

The primary function of the pre and post-tests are to assess student knowledge of basic math, determine if participation in the program is warranted and to develop clear objectives for each student who participates in the program.

The test has been administered over a 4 year period to establish valid norms. The test scores are then related to M.B.S. scores for students who could not be scheduled for remedial math classes at the home school. These individuals, and others who score under 50% on the test, are scheduled for participation. Students with the most need are scheduled first. The program enrollment is kept at a constant 100 students. As students achieve their objectives the post-test is given to assess the student knowledge compared to the pre-test.

Successful achievement on the post-test allows the student to complete the program. The average length of time in the program last year (79-80) was 18 weeks.

STUDENT SELECTION

Students are assigned to the occupational math laboratory on two bases.

1. A school wide test is developed to evaluate competencies in the areas of whole number, fractions, decimals, percent and measurement. It is administered to the entire student body and students with the lowest scores will be identified and assigned to the program.
2. Lists of students from home high schools who have not satisfied the minimum basic skill requirements in math and who could not take remedial work there will be forwarded to the Vo-Tech high school. Many of these students will be able to test out of the program once they realize the importance of the minimum skills test.

PRE-TEST

The pre-test is given the first full week of classes. We bring the clusters to a testing area. We test the students to measure their basic skills or lack of skills. The test is divided into six areas. They are: whole numbers, fractions and decimals and percents and measurement. This enables us to focus on a specific weakness a student might have. The math program is explained in detail as are cut-off scores for program entry.

All students are seated 2 at a table, either at opposite or diagonal corners, all work is to be on test sheets with questions being answered individually. The test is timed at a maximum of 2 hours with early completers returning to their shops. One monitor per 25 students is recommended.

SALEM COUNTY VOCATIONAL - TECHNICAL SCHOOLS

OCCUPATIONAL MATH PLACEMENT TEST

NAME _____ DATE _____

☐ AM

SHOP _____ ☐ PM ☐ SOPHOMORE ☐ JUNIOR ☐ SENIOR

I. WHOLE NUMBERS

1)
$$\begin{array}{r} 4,233 \\ + 907 \\ \hline \end{array}$$

2) $589 + 1,016 = \underline{\hspace{2cm}}$

3)
$$\begin{array}{r} 2,401 \\ - 1,266 \\ \hline \end{array}$$

4) $4,753 - 961 = \underline{\hspace{2cm}}$

5) $3,126$

6) $549 \times 42 = \underline{\hspace{2cm}}$

7) $7/5,124$

8) $3120 \div 15 = \underline{\hspace{2cm}}$

For problems 9 and 10, circle the answer you think will be closest to the right answer.

9) $59 \times 701 =$

a) 4,000 b) 42,000 c) 35,000

10) $13,021 + 6,979 =$

a) 20,000 b) 10,000 c) 19,000

II. FRACTIONS AND DECIMALS

Fill in the spaces in the chart below. The chart shows Equivalent Fractions and Decimals.

FRACTION	DECIMAL
$\frac{1}{10}$	.1 or .10
$\frac{1}{5} \quad (\frac{2}{10})$	.2 or .20
$\frac{1}{4}$	11)
12)	.3 or .30
$\frac{1}{3}$	.33
$\frac{2}{5} \quad (\frac{4}{10})$	.4 or .40
$\frac{1}{2} \quad (\frac{2}{4} \quad \frac{5}{10})$	.5 or .50
13)	.6 or .60
$\frac{2}{3}$	14)
$\frac{7}{10}$	15)
16)	.75
$\frac{8}{10}$	.8 or .80
$\frac{9}{10}$	.9 or .90

III. ROUNDING OFF DECIMALS

Round off each Decimal to 3 Decimal places.

17) 6.2357 = _____

18) 12.00148 = _____

IV. WORKING WITH FRACTIONS

Reduce to Lowest Terms

19) $\frac{18}{16} = \underline{\hspace{2cm}}$

20) $\frac{12}{14} = \underline{\hspace{2cm}}$

21) Convert $\frac{3}{8}$ to a
3-place decimal
 $\underline{\hspace{2cm}}$

22) Convert .35 to a fraction
in its lowest terms $\underline{\hspace{2cm}}$

23)
$$\begin{array}{r} 2\frac{1}{5} \\ + 3\frac{3}{5} \\ \hline \end{array}$$

24) $\frac{3}{4} + \frac{1}{3} = \underline{\hspace{2cm}}$

25)
$$\begin{array}{r} 4\frac{1}{4} \\ - 2\frac{3}{4} \\ \hline \end{array}$$

26) $\frac{7}{8} - \frac{1}{2} = \underline{\hspace{2cm}}$

27) $\frac{2}{3} \times \frac{4}{5}$

28) $1\frac{1}{2} \times 5 = \underline{\hspace{2cm}}$

29) $2\frac{2}{5} \times \frac{1}{2}$

30) $11 \div 4 = \underline{\hspace{2cm}}$

31) $\frac{3}{5} \div \frac{3}{8}$

32) $2\frac{1}{4} \div 3 = \underline{\hspace{2cm}}$

V. WORKING WITH DECIMALS AND PERCENTS

33) $14.325 + 2.5 + \underline{\hspace{1cm}}$ 34) $0.0125 + 1.625 = \underline{\hspace{1cm}}$

35) $3.4162 - 1.0305 = \underline{\hspace{1cm}}$ 36) $4 - 1.317 = \underline{\hspace{1cm}}$

37)
$$\begin{array}{r} 42.25 \\ \times 11 \\ \hline \end{array}$$

38)
$$\begin{array}{r} 7.315 \\ \times 2.3 \\ \hline \end{array}$$

39) $25 \overline{) 17.325}$

40) $3.2 \overline{) 17.048}$

41) $\$4.17 + \$21.00 + \$9.50 + \$1.08 = \underline{\hspace{1cm}}$

42) $\$5 - \$2.39 + \underline{\hspace{1cm}}$

43) An item selling for \$17.95 is on sale at 20% off.
What is the sale price? $\underline{\hspace{1cm}}$

44) If you earn \$220 a week and get a 5% raise, what
will you then earn per week? $\underline{\hspace{1cm}}$

VI. MEASUREMENT

Measure each line below to the nearest $\frac{1''}{4}$

45) _____ = _____

46) _____ = _____

47) _____ = _____

Indicate what each mark on the ruler represents.

48) _____ 49) _____ 50) _____

51) What temperature does this thermometer read? _____

52) If the clocks below represent your clock-in and clock-out times, how long were you on the job?

Hours _____ Minutes _____

VII. WEIGHTS AND MEASURES

Give these answers in their simplest form.

(Example: 3 minutes 70 seconds = 4 minutes 10 seconds)

$$\begin{array}{r}
 53) \quad 3 \text{ HOURS} \quad 20 \text{ MINUTES} \\
 \quad +2 \text{ HOURS} \quad 45 \text{ MINUTES} \\
 \hline
 \quad \quad \quad \text{HOURS} \quad \quad \text{MINUTES}
 \end{array}$$

$$\begin{array}{r}
 54) \quad 9 \text{ FEET} \quad 6 \text{ INCHES} \\
 \quad -4 \text{ FEET} \quad 5 \text{ INCHES} \\
 \hline
 \quad \quad \quad \text{FEET} \quad \quad \text{INCHES}
 \end{array}$$

$$\begin{array}{r}
 55) \quad 3 \text{ POUNDS} \quad 11 \text{ OUNCES} \\
 \quad +7 \text{ POUNDS} \quad 5 \text{ OUNCES} \\
 \hline
 \quad \quad \quad \text{POUNDS} \quad \quad \text{OUNCES}
 \end{array}$$

POST-TEST

This test is an instrument that indicates to the staff that a student has become proficient in areas in which he or she was once deficient before attending our program.

The post-test has specific requirements (listed on cover of sample test document) and the student must meet these requirements to move out of the occupational math program.

Attached you will find a post-test for the Occupational Math Program. To successfully pass this test and thereby complete the program, you must:

1. Have no more than 2 errors in whole numbers and both may not be in the same skill.
2. Have no more than 1 error in Section II and none in Section III.
3. Have no more than 2 errors on page 3 and both may not be in the same skill.
4. Have no more than two errors on page 4, #33-42, and no errors on #43 and #44.
5. Have no errors on page 5 or 6.

SALEM COUNTY VOCATIONAL TECHNICAL SCHOOLS
Occupational Math Post Test

Name _____ Date _____

☐ AM

Shop _____ ☐ PM ☐ Sophomore ☐ Junior ☐ Senior

I. Whole Numbers

1)
$$\begin{array}{r} 2,789 \\ + 1,062 \\ \hline \end{array}$$

2) $3,407 + 861 =$ _____

3)
$$\begin{array}{r} 4,093 \\ - 1,444 \\ \hline \end{array}$$

4) $1,426 - 976 =$ _____

5)
$$\begin{array}{r} 866 \\ \times 73 \\ \hline \end{array}$$

6) $1,134 \times 55 =$ _____

7) $18 \overline{) 3,870}$

8) $2,696 \div 8 =$ _____

For problems 9 and 10, circle the answer you think will be closest to the right answer.

9) $99 \times 399 =$

a) 27,000

b) 36,000

c) 40,000

10) $11,997 - 4,003 =$

a) 9,000

b) 8,000

c) 7,000

II. Fractions and Decimals

Fill in the spaces in the chart below. The chart shows Equivalent Fractions and Decimals. Make sure Fraction answers are given in lowest terms.

FRACTION	DECIMAL
$\frac{1}{10}$	11)
$\frac{1}{5}$ ($\frac{2}{10}$)	.2 or .20
12)	.25
$\frac{3}{10}$	.3 or .30
13)	.33
$\frac{2}{5}$ ($\frac{4}{10}$)	.4 or .40
14)	.5 or .50
$\frac{3}{5}$ ($\frac{6}{10}$)	.6 or .60
$\frac{2}{3}$	15)
$\frac{7}{10}$	.7 or .70
$\frac{3}{4}$	16)
$\frac{4}{5}$ ($\frac{8}{10}$)	.8 or .80
$\frac{9}{10}$	.9 or .90

III. Rounding Off Decimals

17) Round off to the nearest hundredth:

$$46.769 = \underline{\hspace{2cm}}$$

18) Round off to the nearest thousandth:

$$2.069347 = \underline{\hspace{2cm}}$$

IV. Working with Fractions

Reduce to lowest terms:

19) $\frac{12}{24}$

20) $\frac{5}{40}$

21) Convert $\frac{5}{4}$ to a
two-place decimal

22) Convert .16 to a
fraction in its lowest
terms _____

Give each answer below in its lowest terms:

23) $4 \frac{3}{4}$

24) $\frac{1}{2} + \frac{2}{5} =$ _____

$$\begin{array}{r} 5 \frac{1}{4} \\ + \quad \quad \quad \\ \hline \end{array}$$

25) $9 \frac{3}{5}$

26) $\frac{9}{10} - \frac{3}{4} =$ _____

$$\begin{array}{r} 7 \frac{4}{5} \\ - \quad \quad \quad \\ \hline \end{array}$$

27) $\frac{1}{4} \times \frac{2}{5} =$

28) $2 \frac{1}{3} \times 3 =$ _____

29) $4 \frac{1}{2} \times \frac{1}{3}$

30) $15 \div 6 =$ _____

31) $\frac{9}{10} \div \frac{3}{5}$

32) $\frac{3}{8} \div 3 =$ _____

V. Working with Decimals and Percents

$$33) \$71.58 + \$109 = \underline{\hspace{2cm}} \quad 34) 4.1032 + 787.897 = \underline{\hspace{2cm}}$$

$$35) 46.82 - 17.63 = \underline{\hspace{2cm}} \quad 36) \$26 - \$9.18 = \underline{\hspace{2cm}}$$

$$\begin{array}{r} 37) \$34.09 \\ \times 22 \\ \hline \end{array}$$

$$\begin{array}{r} 38) 4.226 \\ \times 3.3 \\ \hline \end{array}$$

$$39) 6 \overline{) 26.52}$$

$$40) 2.4 \overline{) 98.16}$$

$$41) \$21 + \$9.38 + 42¢ + \$5.70 = \underline{\hspace{2cm}}$$

$$42) \$117 - 84¢ = \underline{\hspace{2cm}}$$

43) An item usually selling for \$30.30 is on sale at 15% off. What is the sale price?

44) If you earn \$237 a week and get a 10% raise, what will your new salary be?

VI. Measurement

Measure each line to the nearest $\frac{11}{4}$ inch.

45) _____ = _____

46) _____ = _____

47) _____ = _____

Indicate what each mark on the ruler represents:

49 _____ 50 _____ 51 _____

51) What temperature does this thermometer read? _____

52) If the clocks below represent clock-in and clock-out times, how long were you on the job?

Hours _____ Minutes _____

VII. WEIGHTS AND MEASURES

Give these answers in their simplest form.

(Example: 3 minutes 70 seconds = 4 minutes 10 seconds)

53) 4 FEET 2 INCHES

+ 12 FEET 9 INCHES

_____ FEET _____ INCHES

54) 5 HOURS 53 MINUTES

- 4 HOURS 47 MINUTES

_____ HOURS _____ MINUTES

55) 4 POUNDS 10 OUNCES

+ 2 POUNDS 10 OUNCES

_____ POUNDS _____ OUNCES

FORM LETTERS

Admission to the Occupational Math program is the formal process of enrolling students in the program. As such it should reflect respect for students as individuals and a recognition of the fact that the institution exists solely to serve the needs and aspirations of the student body.

We, at Salem County Vocational Technical Schools, write a personal letter to each student who has been selected to participate in our Occupational Math program. We also write a letter upon the students' successful completion of the program.

Dear

You have been selected to participate in the Occupational Math Program.

You will report directly to the Occupational Math Lab (Room B-5) every , and remain there for the entire session. You will receive individualized instruction in math as it relates to your shop, and you will stay in the program only until you have raised your skills to an acceptable level.

We wish you good luck in this opportunity to improve your skills and increase your job readiness in your chosen Vocational Program.

Sincerely,

Principal

Program Coordinator/Teacher

Dear

has successfully completed the Occupational Math Program at the Salem County Vocational Technical School. In both classwork and testing has shown proficiency in addition, subtraction, multiplication, and division of whole numbers, fractions, decimals and percentage as well as basic measurement. is to be congratulated on mastering of basic computational skills.

Sincerely,

Principal

Dear

has been selected to participate in the Occupational Math Program at the Salem County Vocational Technical School. The program is designed to develop basic math skills, and emphasis will be placed on those areas which relate specifically to each student's vocational program and job readiness.

will begin to attend classes the week of , which will be held in the Occupational Math Laboratory. Students have been assigned by trade clusters to attend 1/2 day a week. Instruction is provided on an individual basis, and attendance will be required until adequate occupational math skills have been achieved.

The vocational school requests your support and encouragement of this opportunity for your child. Any questions concerning the program may be directed to me at 769-0101.

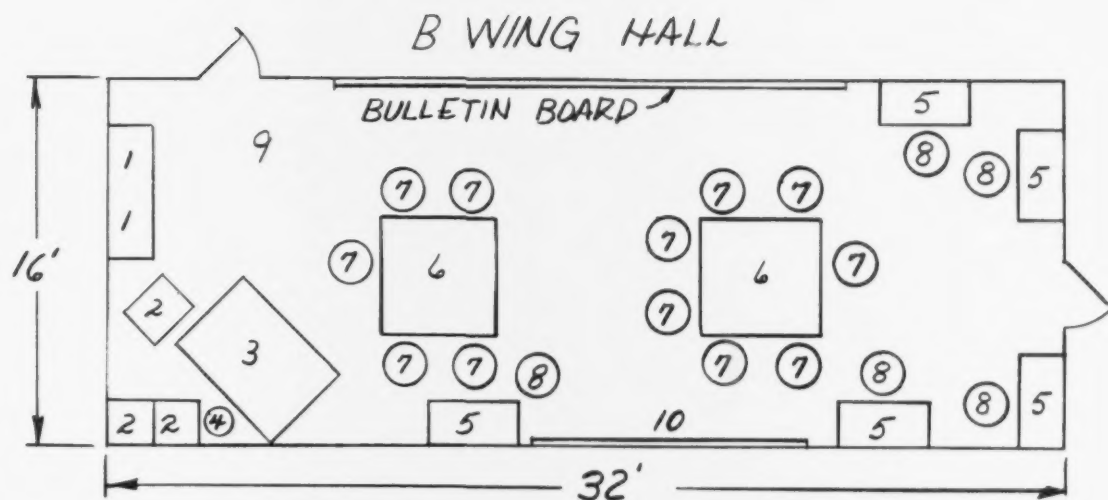
Sincerely,

Principal

THE CLASSROOM ENVIRONMENT

Classroom environment for the Occupational Math Program has been developed to provide the function and appearance of a vocational shop. Students complete their worksheets at work benches and have access to hand and measuring tools commonly utilized in their shops. Lively bulletin boards display specific uses of math as they relate to each occupational cluster. Students work independently in the lab. Class size is ten students who are in the same occupational cluster. They meet once a week for a two-hour and forty-five minute period. The instructor maintains a complete file on each student's progress which consists of pre-tests scores, worksheets, note materials, and specific assignments that are made when remedial work is required utilizing SRA materials or or other audio visual aids dealing with specific elements of math necessary for student competency.

The room is 450 square feet and also includes six study carrels for students to work independently along with the teacher station, chalkboard and a place to locate progress charts which are utilized to monitor each student's progress within their occupational cluster. A floor plan indicates the location of equipment and overall room layout.



**SALEM COUNTY VOCATIONAL TECHNICAL SCHOOLS
OCCUPATIONAL MATH (B-5)
"CAREER CENTER"**

- #1 - Glass Door Storage Cabinet for Measuring Hand Tools
- #2 - Individual Student File Folders
- #3 - Instructor Desk
- #4 - Instructor Chair
- #5 - Study Carrels

- #6 - Maple Top Work Bench
- #7 - Stools
- #8 - Chairs
- #9 - Coat Rack
- #10 - Chalkboard

TEACHING TECHNIQUES AND PROCEDURES

There are three major parts of the Math-PAC program: student selection, material preparation, and instruction. The students are selected for the program from home school recommendations, shop instructor recommendations and pre-test scores. The students who show the most mistakes on the pre-test are chosen first with the students with higher scores following as students complete the program. Classes are organized by cluster with a maximum of ten students.

The major part of the materials needed must be prepared before classes begin. The materials include pre-tests, Math-PAC worksheets and hands-on materials, additional math skill sheets to strengthen student weaknesses, and post-tests. Each student has his/her individual folder with his/her Math-PAC materials. A separate teacher file contains the pre-tests and eventual post-tests.

Teacher instruction is primarily a one-on-one approach. The students work individually on their folders at their own speed. The instructor moves from student to student inspecting their work and answering questions. When a student finishes his/her worksheet he/she gives it to the instruction and begins the next one. If a student doesn't understand a math skill needed to complete a cluster worksheet, additional exercises are recommended to give the student a mastery of the skill. Since the program does not

involve a grade, all worksheets must be completed with 100% accuracy. Group discussions are only applicable when several students are having the same problem. When all the worksheets are completed successfully, the post-test is given. Follow-up exercises are then given for any problems missed on the test. A second test is then given to evaluate the student's mastery of the material. The program is completed only when the student demonstrates his/her understanding of all the programs on the post-test.

ACKNOWLEDGEMENTS

The Salem County Vocational Technical Schools is proud to present the Math-PAC curriculum and gives special thanks to the following individual groups and companies that have helped make the project a success.

The Salem County Board for Vocational Education
for its approval and support of innovative programs.

The State Department of Vocational Education and
Career Preparation for its support, technical
assistance and funding of the project.

The Salem County Vocational Advisory Board for
its suggestions, support and assessment of the
project goals

The faculty and staff of the Salem County Vocational
Technical Schools for their input, support and
continued implementation of project goals.

The Vo-Tech secretarial and clerical staff for
the many hours of typing and duplicating of the
many drafts.

The many companies that allowed parts of their
catalogs and other publications to be re-printed
and used as part of the student work sheets.

The many students that have participated in the program with a positive attitude recognizing the need for increasing their math skills.

The many school districts who have shown interest in the program by visiting the Vo-Tech Career Center.

The American Vocational Association for allowing the program to be presented at its 1980 National Convention.

The local Salem County Guidance and Administrative Personnel for their support and cooperation in transferring student records, granting students the opportunity to participate in the program, their willingness to participate in the program, and their home school guidance of students in the program.

- I. JOB TITLE: Ruler Measurement
- II. JOB DESCRIPTION: Reading the Ruler for Measurement.
- III. INFORMATION NEEDED: The basic tool of all measurement is the ruler. You should know the names of all the marks on the ruler and how to write those names as fractions. Remember, always express units on a ruler in lowest terms.

Example: $2/16 = 1/8$ $4/8 = 1/2$ $12/16 = 3/4$

- IV. MATERIALS NEEDED: Work sheets B-1A and B-1B; pencil.
- V. TASK: Complete work sheet B-1A indicating the names of the points indicated on the ruler. Remember to give the points fractional names that have been reduced to lowest terms.

Complete work sheet B-1B indicating how far it is between points on a ruler and the correctly reduced fractional equivalents.

- VI. QUALITY CONTROL: Take work sheets to supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Teaching the Rule - Materials In File

B. Stein's Refresher Mathematics

1. Measure of Length - Basic Units - pg. 296
2. Common Fractions

- a. Expressing Fraction In Lowest Terms
pg. 89
- b. Changing Improper fractions
- c. Changing mixed numbers to simplest form

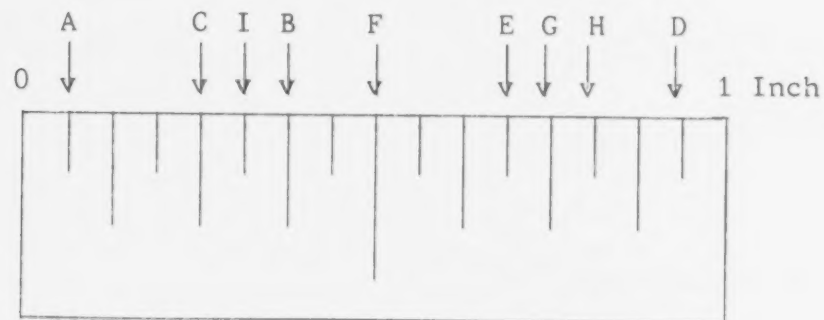
C. Work sheet B-1

D. SRA Kit

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-1

NAME _____ CLUSTER _____ DATE _____



1. How far is it from 0 to H? _____
2. How far is it from 0 to B? _____
3. How far is it from 0 to E? _____
4. How far is it from A to B? _____
5. How far is it from B to D? _____
6. How far is it from C to G? _____
7. How many $\frac{1}{16}$ " are between B - F? _____
8. How many $\frac{1}{16}$ " are between C - G? _____
9. How many $\frac{1}{16}$ " are between B - D? _____
10. What do we call $\frac{4}{16}$ " on the ruler? _____
11. What do we call $\frac{16}{16}$ " on the ruler? _____
12. What do we call $\frac{8}{16}$ " on the ruler? _____
13. What do we call $\frac{12}{16}$ " on the ruler? _____
14. What do we call $\frac{6}{16}$ " on the ruler? _____
15. What do we call $\frac{2}{16}$ " on the ruler? _____
16. What do we call $\frac{10}{16}$ " on the ruler? _____
17. What do we call $\frac{14}{16}$ " on the ruler? _____

- I. JOB TITLE: Measuring in Carpentry
- II. JOB DESCRIPTION: Measuring wood as accurately as possible.
- III. INFORMATION: See JOB NUMBER B-1 for instructions on recording proper measurements.
- IV. MATERIALS NEEDED: 10 pieces of wood of varying lengths and thicknesses; 6 foot folding rule; 6 foot tape measure; pencil; work sheet B-2.
- V. TASK:
 - A. Measure length, width and thickness of each plank with 6 foot rule and record results on work sheet B-2.
 - B. Measure length, width and thickness of each plank with tape measure and record results on work sheet B-2.
 - C. Compare results and answer questions on work sheet B-2.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCE:
 - A. Pieces of material located in cabinet.
 - B. Stein's Refresher Mathematics
 - 1. Measure of length - basic units - Pg. 296
 - 2. Common fractions
 - a. Expressing fractions in lowest terms - pg. 89
 - b. Changing improper fractions
 - c. Changing mixed numbers to simplest form
 - C. Work sheet B-2
 - D. SRA Kit

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-2

NAME _____ CLUSTER _____ DATE _____

6' FOLDING RULE

6' TAPE

MEASURE

Wood Plank	Length	Width	Thickness	Length	Width	Thickness
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

1. Are there any differences in results?
Where?
2. What may cause a difference?

- I. JOB TITLE: Formulas in Masonry
- II. JOB DESCRIPTION: Using formulas in Masonry to find out how much material is needed for a job.
- III. INFORMATION NEEDED:
- A. To determine how many cinder blocks are needed for a particular size wall, multiply the length and height of the wall (expressed in feet) times 1.125.
- Example: For a wall 10 ft. long and 5 feet high $10 \times 5 \times 1.125 = 56.25 = 57$ blocks.
- Round off to next highest number of blocks.
- B. To determine how many common bricks are needed for a particular size wall (expressed in feet) times 7.
- Example: For a wall 10 ft. long and 5 feet high $10 \times 5 \times 7 = 350$ bricks.
- NOTE: If both sides of the wall show, multiply by 2 $350 \times 2 = 700$.
- IV. MATERIALS NEEDED: Work sheet B-3; pencil; 6 foot rule.
- V. TASK: Complete work sheet B-3.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Multiplication of whole numbers
 2. Multiplication of decimals
- B. S.R.A. Kit
- C. Work sheet B-3

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-3

NAME _____ CLUSTER _____ DATE _____

1. How many cinder blocks are needed to build the following walls:

Height	Length	Number Of Blocks
8 ft.	16 ft.	
11 ft.	4 yards	
78 inches	156 inches	

2. How many common bricks are needed to build the following walls:

Height	Length	Number Of Common Bricks	If Both Sides of Wall Show No. of Bricks
7 ft.	20 ft.		
3 yards	18 ft.		
90 inches	192 inches		

3. Measure any wall area of your choosing in the room.

A. How many blocks would be needed to build it?

B. How many bricks would be needed to build it?

- I. JOB TITLE: Concrete in Masonry
- II. JOB DESCRIPTION: Determining the amount of concrete needed for floors and footings.
- III. INFORMATION NEEDED:

- A. To pour a standard 4 inch deep concrete floor, multiply the length times the width (expressed in feet) and divide the answer by 81. The amount will be expressed in cubic yards.

Example: For a floor 18 ft. long and 9 ft. wide

$$\frac{18 \times 9}{81} = \frac{162}{81} = 2 \text{ cubic yards of concrete}$$

- B. To pour footings (trenches of concrete underneath walls), standard areas are 12 inches by 12 inches. Each foot of a footing is one cubic foot. There are 2 cubic feet in each cubic yard.

Example: For a standard footing 81 feet long you need 3 cubic yards of concrete.

$$\frac{81}{27} = 3 \text{ cubic yards}$$

- IV. MATERIALS NEEDED: Work sheet B-4.
- V. TASK: Complete work sheet B-4.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Bricklaying - Skill & Practice
1. Math For the Bricklayer pg. 242
- B. Modern Masonry
1. Mathematics For Masonry Trades - pg. 75
- C. S.R.A. Kit
- D. Work sheet - B-4

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-4

NAME _____ CLUSTER _____ DATE _____

1. How many cubic yards of concrete would be needed to pour the following floors:

LENGTH	WIDTH	CONCRETE
486 ft.	10 ft.	
972 inches	729 inches	
21 yards	15 yards	

2. How many yards of concrete would be needed for the following footings:

LENGTH OF FOOTING	CONCRETE
54 ft.	
243 ft.	
216 inches	
108 yards	

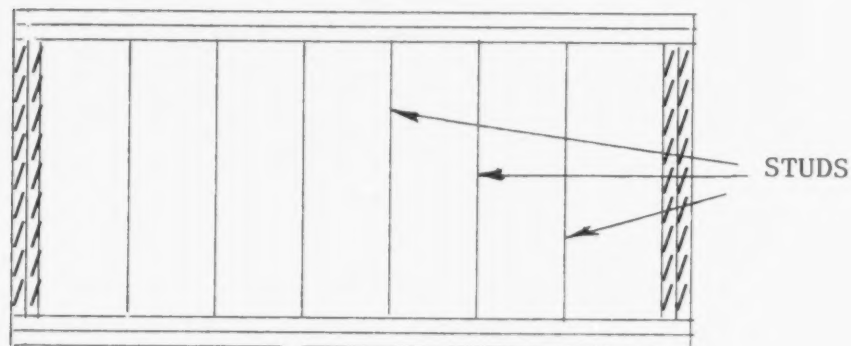
3. Measure the floor of this room.

- a. How much concrete would be needed for a 4 inch floor?

- b. How much concrete would be needed for a standard 12 x 12 footing all around the outside of the room? _____

What should you do about the corners?

- I. JOB TITLE: Sketching in Carpentry
- II. JOB DESCRIPTION: Placing studs on a scale drawing.
- III. INFORMATION NEEDED: In building a wall for a house, studs are vertical (up and down) supports for the wall. They are placed exactly 16 inches apart. You can show where the studs go by drawing vertical lines on the sketch.

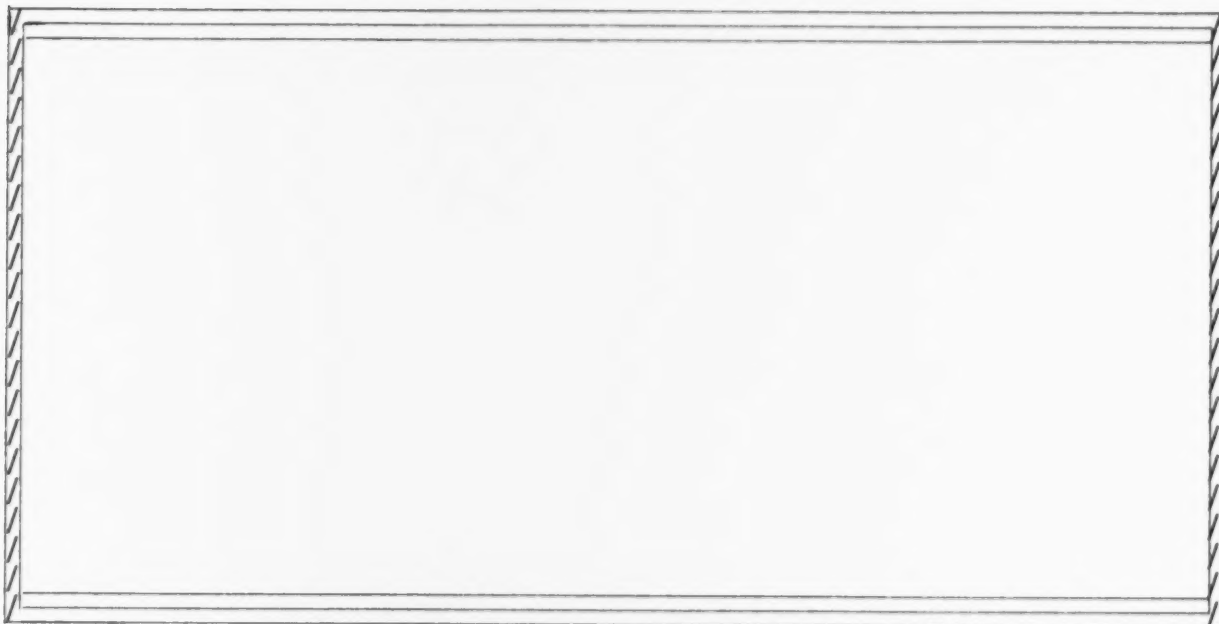


- IV. MATERIALS NEEDED: Work sheet B-5, ruler; pencil.
- V. TASK: Work sheet B-5 has a scale drawing of a wall that is being built. Draw in the places where the studs should go. Be careful. You will notice that on this drawing every inch represents one foot on the real wall.
- VI. QUALITY CONTROL: Ask supervisor to check your work.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Relationship of English & Metric Systems
- a. Equivalent - pg. 447
- B. Work sheet B-5

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-5

NAME _____ CLUSTER _____ DATE _____



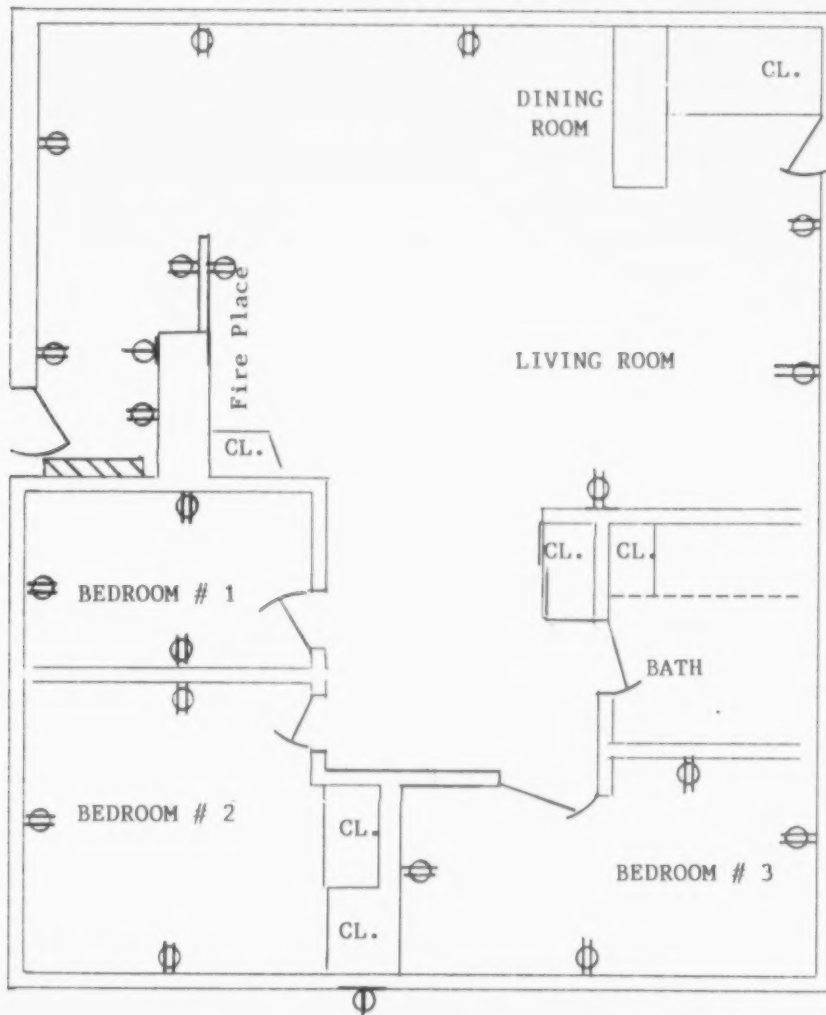
SCALE: 1 inch = 1 foot

- I. JOB TITLE: Electrical Outlet
- II. JOB DESCRIPTION: Calculating voltage in a house.
- III. INFORMATION NEEDED:
- IS A CONVENTIONAL OUTLET = 120 VOLTS (v)
- IS A SPECIAL PURPOSE OUTLET - 230 V
- IS A DISTRIBUTION PANEL = 240 V
- IV. MATERIALS NEEDED: Worksheet B-6; pencil
- V. TASK: On work sheet B-6, calculate the number of conventional outlets, special purpose outlets, and distribution panels in the house and fill out the table.
- VI. QUALITY CONTROL: Take work to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
- A. Modern Masonry
1. Blueprint Reading
- a. Borderlines
- b. Building Material Symbols
- c. Topographical Symbols
- d. Plumbing Symbols
- e. Climate Control Symbols
- f. Electrical Symbols
- B. Work sheet B-6

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

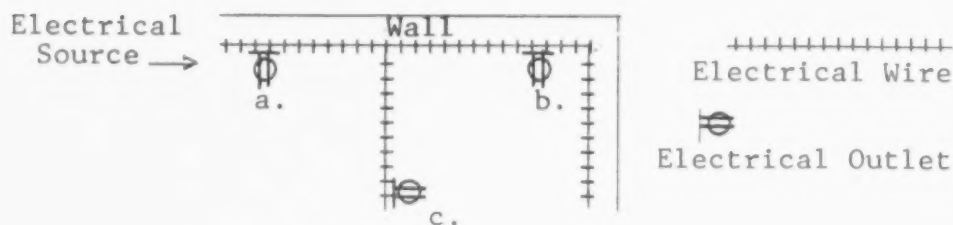
WORK SHEET # B-6

NAME _____ CLUSTER _____ DATE _____



Symbol	Description	Number In House	Volts For Each	Total Volts
	Distribution Panel			
	Conventional Outlet			
	Special Purpose Outlet		120 V	
Total Voltage =				

- I. JOB TITLE: Electrical Wiring
- II. JOB DESCRIPTION: Finding the length of electrical wire needed in a house addition.
- III. INFORMATION NEEDED: Electrical wiring in a house is set up in series. That means that a number of outlets can come off one wire.



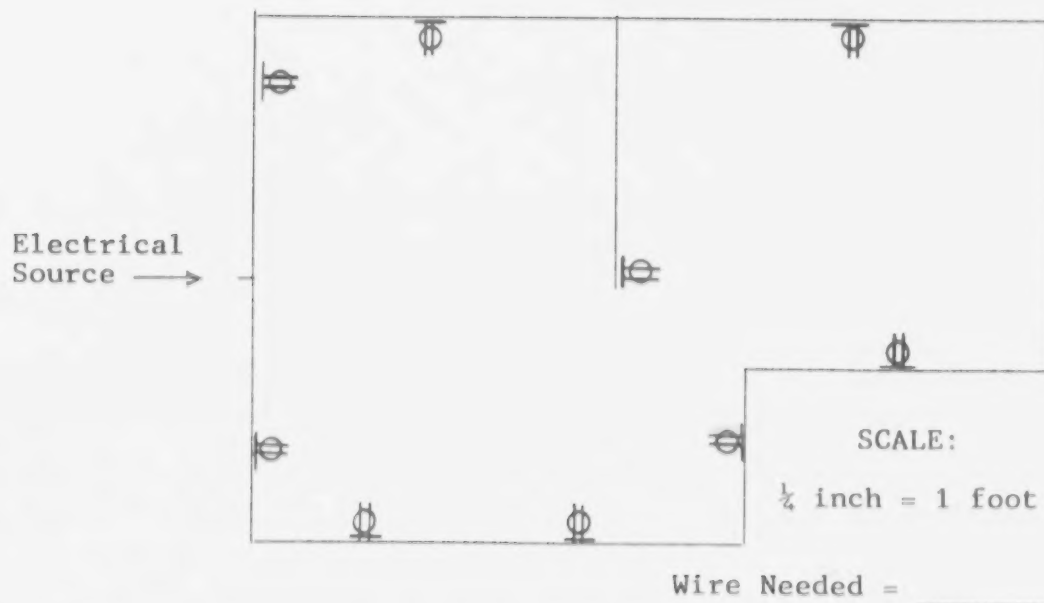
The wire that goes to outlet C is spliced into the main wire.

- IV. MATERIALS NEEDED: Work sheet B-7; pencil.
- V. TASK: Complete work sheet B-7
- VI. QUALITY CONTROL: Have supervisor check your work.
- VII. PAY: \$3.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Electrical Construction Wiring - Alerich
1. Residential Blue Print Reading - pg. 25
- a. Symbols
- b. Architect Scales
- c. Blue prints
- B. Work sheet B-7

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-7

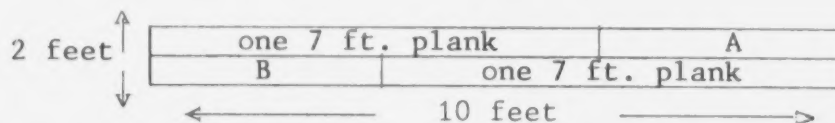
NAME _____ CLUSTER _____ DATE _____



This is a scale drawing of an addition to a house. The contractor will put outlets where they are marked. Figure out how much wire he will need to do the job. You may go in either direction along the wall. Use as little wire as possible. Your answer should be the actual distance, not the scale distance.

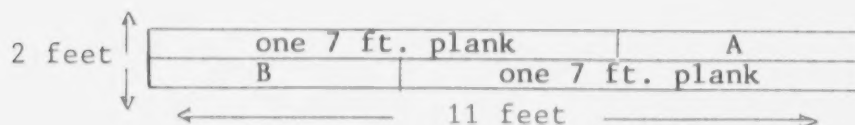
- I. JOB TITLE: Laying Flooring
- II. JOB DESCRIPTION: Figuring out the number of planks or tiles needed to cover a floor.
- III. INFORMATION NEEDED: When you use planks to cover a floor, you cut the planks to fit. Do not make pieces smaller than one foot. Planks usually measure 1 foot x 7 feet.

EXAMPLE: #1 Cover this 10 ft. x 2 ft. area with planks. How many will you need?



Pieces A, B are 3 feet long each. Together they can be cut from one 7 ft. plank. Therefore, you need 3 planks to cover the 2 x 10 floor.

EXAMPLE: #2 Cover an 11ft. x 2 ft. area with planks. How many will you need?



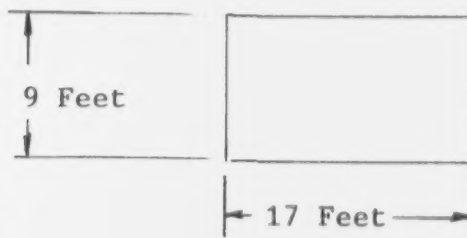
Pieces A, B are 4 feet long each. You cannot cut pieces A & B from the same 7 foot plank. Therefore, you need 4 planks to cover the 2 x 11 floor.

- IV. MATERIALS NEEDED: Work sheet B-8, folding rule; pencil.
- V. TASK: Complete work sheet B-8
- VI. QUALITY CONTROL: Ask supervisor for help when needed and have him/her check your work.
- VII. PAY: \$5.70
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Stein's Refresher Mathematics

1. Multiplication of whole numbers - 43
2. Division of whole numbers - 52

- B. S.R.A. Kit
- C. Work sheet B-8

- I. JOB TITLE: Determining Carpet Needs
- II. JOB DESCRIPTION: Finding square yardage in a building
- III. INFORMATION NEEDED: To find the area of a room, multiply length x width.

EXAMPLE:

$$\text{Area} = 17 \times 9 = 153 \text{ Square Feet}$$

Carpet is sold by square yards. There are 3 feet in a yard. So, 3 ft. x 3 ft. = 9 square feet = 1 square yard.

To change 153 square feet into square yards, just divide by 9.

$$\begin{array}{r} 17 \text{ Square yards} \\ 9 \overline{) 153} \text{ Square feet} \\ \underline{9} \\ 63 \\ \underline{63} \\ 0 \end{array}$$

- IV. MATERIALS NEEDED: Work sheet B-9; pencil
- V. TASK: Complete work sheet B-9
- VI. QUALITY CONTROL: Have supervisor check your work.
- VII. PAY: \$4.10
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Practical Applications - Measuring areas pg. 371
 - a. Rectangle - 371
 - b. Square - 372
 - c. Parallelogram - 373
 - d. Triangle - 374
 - e. Trapezoid - 374

- f. Circle - 375
- g. Rectangular Solid - 377
- h. Cube - 378
- i. Cylinder - 378
- j. Sphere - 380

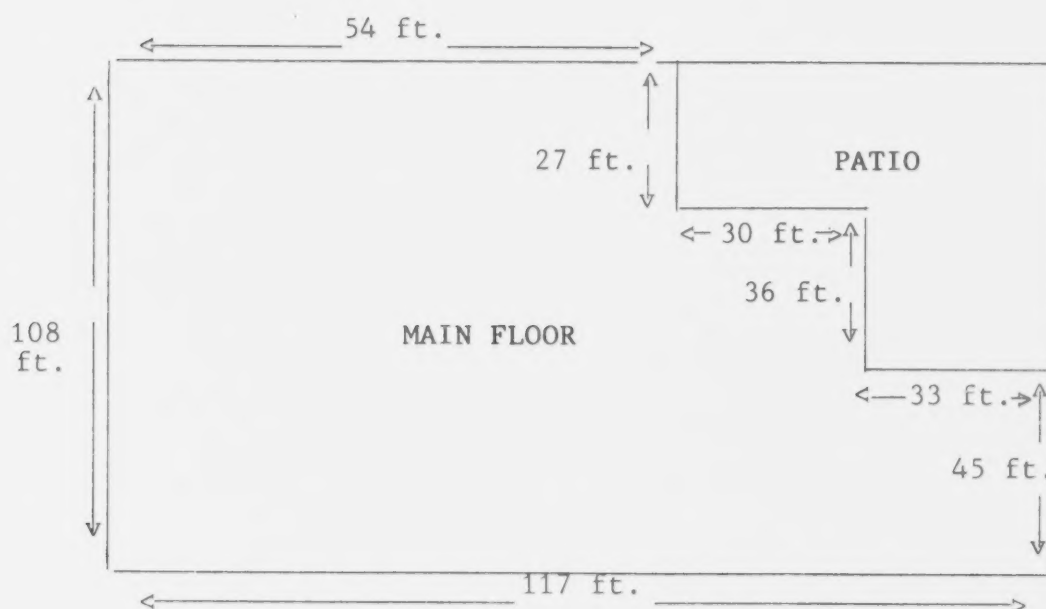
B. S.R.A. Kit

C. Work sheet B-9

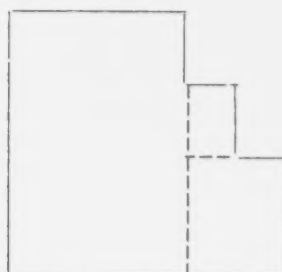
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-9

NAME _____ CLUSTER _____ DATE _____



1. Find the area of the main floor in square feet.



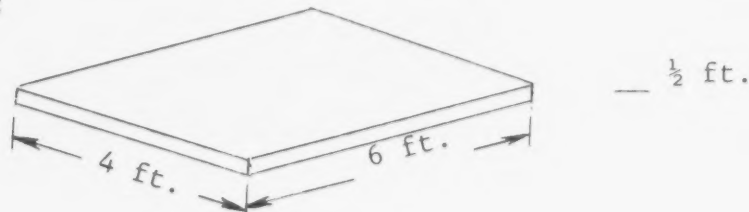
You can think of the floor as broken up into smaller area.

2. Change the square feet to square yards. _____

3. If carpet costs \$14.88 per square yard, what will be the total cost of carpeting the main floor?
-

- I. JOB TITLE: Laying a Sidewalk
- II. JOB DESCRIPTION: Calculating the amount of concrete needed to lay a sidewalk.
- III. INFORMATION NEEDED: To find the volume of any object, you have to multiply the length times the width times the thickness. This will give you an answer in cubic feet. (Cubic means in the shape of a box, like an ice cube.)

EXAMPLE:



$$\begin{aligned} &= 24 \times \frac{1}{2} \\ &= 12 \text{ cubic feet} \end{aligned}$$

- IV. MATERIALS NEEDED: Work sheet B-10; pencil
- V. TASK: Complete work sheet B-10
- VI. QUALITY CONTROL: Have supervisor check your work.
- VII. PAY: \$3.90
- VIII. MATERIALS UTILIZED FOR LEARNING EXPENSES
- A. Stein's Refresher Mathematics
1. Practical Applications - measuring volume
- a. Rectangular Solid - 385
 - b. Cube - 386
 - c. Right Circular Cylinder - 387
 - d. Sphere - 388
 - e. Right Circular Cone - 388
 - f. Pyramid - 389
- B. S.R.A. Kit
- C. Work sheet B-10

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-10

NAME _____ CLUSTER _____ DATE _____

1. What is the area of each piece of sidewalk in square inches? _____
2. How many squares are there all together?

3. What is the total area of all these square pieces?

4. If each piece is $\frac{1}{2}$ ft. thick, what is the volume of each? _____
5. What is the total volume of the sidewalk?

6. If concrete weighs 30 pounds per cubic foot, what is the total weight of the sidewalk? _____
7. If the total cost of laying a sidewalk (including lumber framing and labor) is \$45.00 per cubic foot) what is the cost of laying this sidewalk? _____
8. Contractors often add a little extra money to their cost estimates just in case something goes wrong. In this case you need to add an extra 10%.
 - A. What is 10% of the cost you found in question 7?

 - B. When you add this amount to the cost in question 7, what is your new total cost? _____

- I. JOB TITLE: Kilowatt Hours
- II. JOB DESCRIPTION: Determining kilowatt hours of electricity used utilizing a calculator.
- III. INFORMATION NEEDED:
When the electric company charges a home or business for electricity, it charges per kilowatt hours.

A watt is a unit of electrical power needed to run electrical appliances.

A kilowatt is 1,000 watts of power.

A kilowatt - hour is the amount of power needed to provide 1,000 watts for 1 hour (or 500 watts for 2 hours, or 100 watts for 10 hours etc.)

Example: If you run two 100 watt bulbs for 11 hours you have:

2 bulbs x 100 watts x 11 hours = 2200 watt-hours

To change this to kilowatt hours, divide by 1000:

$$\frac{2200}{1000} = 2.2 \text{ kilowatt hours.}$$

If the charge per kilowatt hour is $6\frac{1}{2}\text{¢}$, then the cost is:

$$6\frac{1}{2} \times 2.2 = 6.5 \times 2.2 = 14.3\text{¢ or 14 cents}$$

(Notice we change the fraction $\frac{1}{2}$ to .5 to multiply by the decimal 2.2)

- IV. MATERIALS NEEDED: Work sheet B-11; pencil; electronic calculator.
- V. TASK: Complete work sheet B-11 using an electronic calculator to find the number of kilowatt hours of electricity used and the cost of that amount of electricity.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
- I. Spending money.
- a. gas, electricity, water, testing, - 554
- B. Work sheet B-11

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-11

NAME _____ CLUSTER _____ DATE _____

This is the amount of power used in a house for a month.
The charge is 6½¢ per kilowatt hour.

Appliance	Number Used	Watts Per Hour	Hours In Operation	Watt Hours	Kilowatt Hours	Cost
Lights	3	60	140 each			
Lights	7	100	166 each			
Refrigerator	1	230	720			
Air conditioner	2	310	135 each			
Dish washer	1	250	91			
Washing machine	1	280	74			
Dryer	1	295	80			
Televisions	3	270	90 each			
Vacuum cleaner	1	168	22			
Radios	2	145	140			
Stereo	1	300	105			
Others	-	150	200			
TOTALS:						

Fill in the spaces under watt hours, kilowatt hours, and cost using the calculator.

- I. JOB TITLE: Steel Beam Columns
- II. JOB DESCRIPTION: Finding the safe load in pounds for steel beam columns.
- III. INFORMATION NEEDED: The table showing the safe load in thousands of pounds for different sizes of I beam can be found on the work sheet. One has been circled as an example:

The 6 circles shows that the column has an effective length of 6 feet.

The 7 circles shows that it is a 7 inch I beam with a weight of 15.3 pounds per foot.

Straight lines from the 6 and the 7 cross at the number 43.1 (marked with a circle and a rectangle. This means that an I beam 6 feet long and 7 inches in size can carry a safe load of 43.1 thousand pounds (43,100).

- IV. MATERIALS: Work sheet B-12; pencil
- V. TASKS: Answer the questions at the bottom of work sheet B-12 referring to the table provided.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.10
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Measure of weight - pg. 400
- B. Work sheet B-12

4. You have a 10 foot long I beam that has to carry a safe load of at least 30,000 pounds. What size will it be? _____
5. You need to support 37,000 pounds. Which I beam will support the weight safely? _____
6. You have a 10 foot I beam 8 inches in size. How much more weight will it support if you cut 3 feet off of it? _____
7. Which will support more weight? _____
- a) A 7 foot I beam 6 inches in size?
- b) A 7 inch I beam 9 feet long?

SALEM COUNTY DEVELOPMENT CORPORATION

WORK SHEET # B-12

NAME _____ CLUSTER _____ DATE _____

STEEL BEAM COLUMNS, SAFE LOAD IN THOUSANDS OF POUNDS

I BEAMS

Effective length, feet	Size, inches				
	8	7	6	5	4
	Weight, pounds per foot				
	18.4	15.3	12.5	10.0	7.7
3	69.3	57.5	46.9	37.3	28.5
4	69.3	57.6	44.4	33.5	24.0
5	63.3	49.9	38.3	28.2	19.5
6	55.7	43.1	32.3	22.9	15.2
7	48.1	36.2	26.2	18.9	13.0
8	40.5	30.2	22.7	16.3	10.8
9	35.1	26.8	19.7	13.6	8.5
10	31.3	23.4	16.7	11.0	6.3

- What is the safe load in pounds for a 9 foot long I beam 5 inches in size? _____
- What is the safe load in pounds for a 4 foot long I beam with a weight of 7.7 pounds per foot? _____
- How long will a 6 inch I beam be if it can carry a safe load of 44.4 thousand pounds? _____

- I. JOB TITLE: Roofing Dimensions
- II. JOB DESCRIPTION: Using Rise, Run, Span in calculating roofing dimensions.
- III. INFORMATION NEEDED: The diagram on work sheet B-13 shows a side view of a house roof. Notice that the rise is the distance from the base of the roof straight up to the peak.

The scale of this diagram is 1 inch to 3 feet. This means that every inch of distance in the drawing stands for 3 feet of distance on the real roof.

- IV. MATERIALS NEEDED: Work sheet B-13; ruler; pencil
- V. TASK: Using the diagram provided, answer the questions at the bottom of work sheet B-13.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$1.95

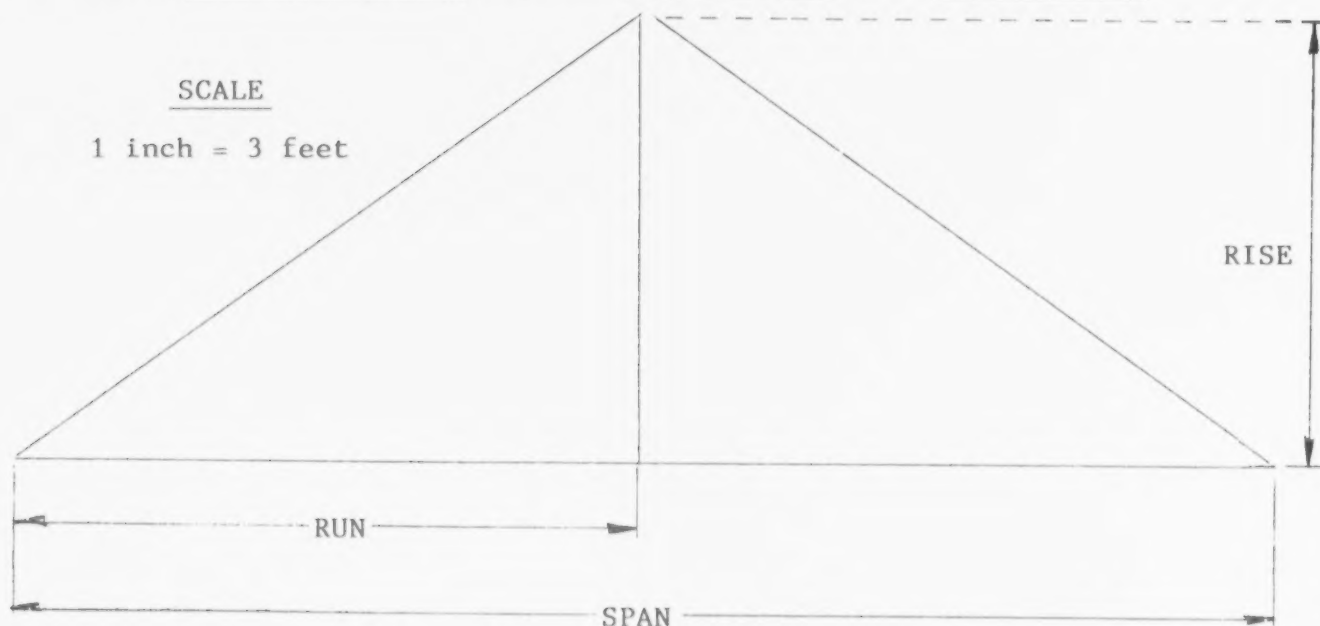
VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

- A. Stein's Refresher Mathematics
 - 1. Metric System - measure of length, volume, area, capacity and weight - pg. 433
- B. Work sheet B-13

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-13

NAME _____ CLUSTER _____ DATE _____



Using a ruler, measure the rise, run and span in the diagram above. Using the scale figure out the correct size of each dimension in feet.

RISE = _____ INCHES = _____ FEET

RUN = _____ INCHES = _____ FEET

SPAN = _____ INCHES = _____ FEET

1. If the run were $5 \frac{1}{3}$ inches on the drawing, what actual length would it represent? _____
2. In the same drawing, what would the span be on the drawing? _____ on the real building?
3. If the rise gets bigger, what happens to the run?

4. With the same scale, how long would the rise, run and span be on a drawing if the actual building has these dimensions:

	BUILDING	DRAWING
RISE =	$3 \frac{1}{2}$ FEET	_____
RUN =	15 FEET	_____
SPAN =	_____	_____

5. Sketch this drawing (to scale) on your work sheet.

- I. JOB TITLE: Horsepower
- II. JOB DESCRIPTION: Finding the horsepower needed to produce a current.
- III. INFORMATION NEEDED: The formula for the horsepower of a motor is:

$$\text{Hp} = \frac{I \times E \% \text{ EFR}}{746}$$

$$\text{Hp} = \text{horsepower}$$

$$I = \text{current in amps}$$

$$E = \text{voltage}$$

$$\% \text{EFR} = \text{efficiency of an engine stated as a percentage}$$

$$746 = \text{a constant factor}$$

EXAMPLE: What horsepower would be produced if you were to operate a motor at 110 volts of electricity, 15 amps of current and working at 83.5% efficiency? (Remember 83.5% is converted to a decimal, .835)

$$\text{Hp} = \frac{(15 \text{ amps}) (110 \text{ volts}) (.835)}{746}$$

On the calculator, this is done step by step:

$$[15] \times [110] \times [.835] \div [746] = 1.8468498 \text{ Hp.}$$

Round answer off to 2 Hp.

- IV. MATERIALS NEEDED: Work sheet B-14; pencil; calculator.
- V. TASK: Complete work sheet B-14
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.10
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Measure of speed - pg. 456
 2. Precision and accuracy - pg. 464
- B. Work sheet B-14

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-14

NAME _____ CLUSTER _____ DATE _____

Find the horsepower for each engine in the chart:

ENGINE	I CURRENT	E VOLTAGE	% EFFICIENCY	HP HORSEPOWER
1	15 amps	110 volts	81.3%	
2	15 amps	220 volts	81.3%	
3	15 amps	110 volts	88%	
4	25 amps	110 volts	88.4%	
5	25 amps	220 volts	88.4%	

- I. JOB TITLE: Ohm's Law
- II. JOB DESCRIPTION: Finding voltage, current and resistance using a formula.
- III. INFORMATION NEEDED: There are three forms of Ohm's Law, one each for finding voltage (E) current (I) and resistance (R).

$$\text{FORM E: } E = I \times R$$

$$\text{FORM I: } I = \frac{E}{R}$$

$$\text{FORM R: } R = \frac{E}{I}$$

Voltage is expressed in volts; current is expressed in amps; and resistance is expressed in ohms.

EXAMPLE: Find the current when voltage is 135 volts and resistance is 9 ohms. Since you want to find current you use Form I.

$$I = \frac{E}{R}$$

$$I = \frac{135}{9}$$

$$I = 15 \text{ amps of current}$$

- IV. MATERIALS NEEDED: Work sheet B-15; pencil.
- V. TASK: Complete work sheet B-15.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$1.85
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCE
- A. The Ohm Meter - Found in file
 - B. Stein's Refresher Mathematics
 - 1. Spending money
 - a. Gas, electricity - pg. 554
 - C. Work sheet B-15

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-15

NAME _____ CLUSTER _____ DATE _____

Find the missing elements in the table. Make sure you indicate what form of Ohm's Law you use in each case.

	E VOLTAGE IN VOLTS	I CURRENT IN AMPS	R RESISTANCE IN OHMS	FORM OF OHM'S LAW USED
1.	110	15		
2.	220		11	
3.		25	7	
4.	225	25		
5.		20	9	
6.	115		5	

- I. JOB TITLE: Metric - English Measurement
- II. JOB DESCRIPTION: Comparing metric to English units of measurement.
- III. INFORMATION NEEDED: More and more kinds of items are being measured in metric units all the time: kilometers, liters, grams etc. In Europe, metric units are the only kind that are used. The United States will probably "go metric" in just a few years. It is important that we begin to understand how metric measurements work.

Attached to this job sheet is a table of conversions for English and metric units. Study it carefully.

EXAMPLE: 1 foot = 0.3048 meters

What does this mean?

If we round off the decimal, 1 foot = .3 meter or $\frac{3}{10}$ of a meter.

A foot is $\frac{3}{10}$ of a meter or less than a third. That means a meter is a little more than 3 feet (1 yard) long. This is only an "approximation" but this kind of information helps make sense of metric units when you have to use them.

- IV. MATERIALS NEEDED: Metric - English Conversion Table; work sheet B-19.
- V. TASK: Use conversion table to complete work sheet B-19
- VI. QUALITY CONTROL: Take work sheets to supervisor to be checked.
- VII. PAY: \$2.00
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Metric Systems - Introduction - 432
 2. Relationship of English & Metric Systems pg. 444
 3. Metric System - Measure of length, area, volume, capacity and weight - pg. 433
- B. Film - System's International - File cabinet
- C. Work sheet B-16A & B-16B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-16

NAME _____ CLUSTER _____ DATE _____

METRIC-ENGLISH CONVERSION TABLE

1 foot	=	0.3048 meters
1 foot, cubic	=	0.0283 cubic meters
1 foot, square	=	0.0929 square meters
1 inch	=	0.0254 meters
1 inch	=	2.54 centimeters
1 mile	=	1/6093 kilometers
1 pint, liquid	=	0.4732 liters
1 pound	=	0.4536 kilograms
1 yard	=	0.9144 meters
1 yard, cubic	=	0.7646 cubic meters
1 yard, square	=	0.8361 square meters
1 centimeter	=	0.3937 inches
1 gram	=	0.0353 ounces
1 kilogram	=	2.2046 pounds
1 kilometer	=	0.6214 miles
1 liter	=	2.1134 liquid pints
1 meter	=	3.2808 feet
1 meter	=	39.37 inches
1 meter	=	1.0936 yards

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

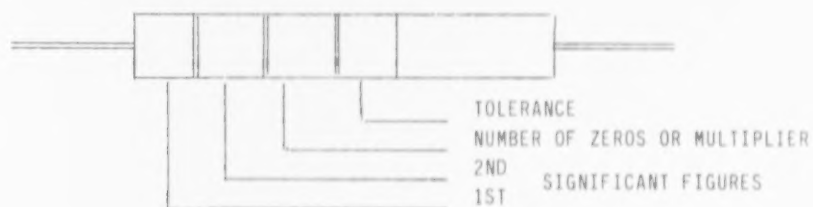
WORK SHEET # B-16

NAME _____ CLUSTER _____ DATE _____

The answers to all these questions can be determined from looking carefully at the conversion table.

1. Which is longer, a yard or a meter? _____
2. Which is longer, a kilometer or a meter? _____
3. About how many pounds would it take to make a kilogram? _____
4. How many centimeters are there in an inch? _____
5. How many inches are there in a centimeter? _____
6. About how many liquid pints are there in a liter? _____
7. Which is heavier, a gram or an ounce? _____
8. How many inches are there in 2 meters? _____
9. Which is bigger, a square meter or a square yard? _____
10. About how many inches are there in one decimeter? (10 centimeters) _____
11. How many pounds are there in one kilogram? _____
12. How many centimeters are there in 10 inches? _____

- I. JOB TITLE: Color Codes for Resistors
- II. JOB DESCRIPTION: Finding the resistance of a resistor from the color code.
- III. INFORMATION NEEDED: Most resistors have four bands around them. Some have only three. Starting from one end of the resistor, the first band indicates value of that resistor. (The first significant figure means the first figure, so long as it is not an initial zero following a decimal point. For example, the first significant figure in the number .078 is 7.)



RESISTOR COLOR CODE

Study the Resistor Color Code table, and you will be able to understand how a resistor color coded RED RED RED GOLD would be read 2200 ohms + 5%. The first band, being red, tells you that the first figure is a 2. The next band, being red, tells you that the second figure is another 2. The third band (the multiplier band), being red, tells you that the first and second figures are to be multiplied by 100. So, you have $22 \times 100 = 2200$.

COLOR	1ST DIGIT	2ND DIGIT	MULTIPLIER	TOLERANCE (PERCENT)
Black	0	0	1	
Brown	1	1	10	
Red	2	2	100	
Orange	3	3	1,000	
Yellow	4	4	10,000	
Green	5	5	100,000	
Blue	6	6	1,000,000	
Violet	7	7	10,000,000	
Gray	8	8	100,000,000	
White	9	9	1,000,000,000	
Gold			.1	5
Silver			.01	10
No Color				20

RESISTOR COLOR CODE TABLE

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-17

NAME _____ CLUSTER _____ DATE _____

What are the resistance values of the resistors
color-coded as follows:

_____	1.	WHITE	BLACK	ORANGE	GOLD
_____	2.	BROWN	WHITE	RED	GOLD
_____	3.	GREEN	ORANGE	ORANGE	
_____	4.	GRAY	BLACK	BLACK	SILVER
_____	5.	BROWN	BROWN	BROWN	GOLD
_____	6.	BLUE	YELLOW	YELLOW	
_____	7.	VIOLET	YELLOW	RED	
_____	8.	GREEN	RED	ORANGE	SILVER
_____	9.	GRAY	ORANGE	ORANGE	GOLD
_____	10.	RED	RED	RED	
_____	11.	ORANGE	ORANGE	ORANGE	
_____	12.	BROWN	RED	YELLOW	
_____	13.	BROWN	GRAY	ORANGE	
_____	14.	BROWN	VIOLET	RED	
_____	15.	YELLOW	YELLOW	YELLOW	
_____	16.	YELLOW	BROWN	BLACK	
_____	17.	YELLOW	RED	RED	
_____	18.	YELLOW	BLACK	BLACK	GOLD
_____	19.	BLUE	ORANGE	ORANGE	SILVER
_____	20.	BLUE	BLACK	BROWN	
_____	21.	GREEN	RED	RED	
_____	22.	GREEN	ORANGE	ORANGE	GOLD
_____	23.	GREEN	BROWN	YELLOW	SILVER
_____	24.	BROWN	BLACK	BLUE	
_____	25.	BLACK	BROWN	GOLD	GOLD

- I. JOB TITLE: Reading Milliamperes
- II. JOB DESCRIPTION: Using an ammeter scale to measure milliamperes.
- III. INFORMATION NEEDED: Study work sheets B-18A and B-18B.
- IV. MATERIALS NEEDED: Work sheets B-18A, B-18B, B-18C; pencil.
- V. TASK: Complete work sheet B-18C.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$1.90
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. The Amp-rater found in file
 - B. Work sheet 18-A, 18-B, 18-C

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-18A

NAME _____ CLUSTER _____ DATE _____

READING MILLIAMPERES

The unit of current is the ampere.

Most of the time electricians measure current that is less than 1 ampere. They often measure in milliamperes. There are 1000 milliamperes in 1 ampere.

A light bulb may use $\frac{1}{2}$ ampere of current. It would use $\frac{1}{2} \times 1000$ milliamperes, or 500 MA of current.

Here is a milliampere scale



It goes from 0 to 100 MA.

Below is a small part of this scale.

There are 10 little marks between 0 and 10 and between 10 and 20.



Each mark is a milliampere. The first mark means 1 MA, the second mark means 2 MA, and so on.

After the 10, the first mark means $10 + 1$ or 11 MA. The second mark means $10 + 2$ MA, and so on.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-18B

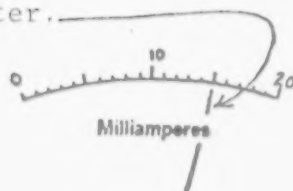
NAME _____ CLUSTER _____ DATE _____

READING MILLIAMPERES

Look at the pointer below. It is pointing to the number 10. The reading is 10 MA.



Now look at this pointer.



It is pointing to the 5th mark after the 10. The reading is $10 + 5$ or 15 MA.



Now look at this pointer. It is pointing to the 8th mark after the 10. The reading is 18 MA.

Do you think you know how to read a milliammeter? Try this.



If you said 65 MA, you were right.

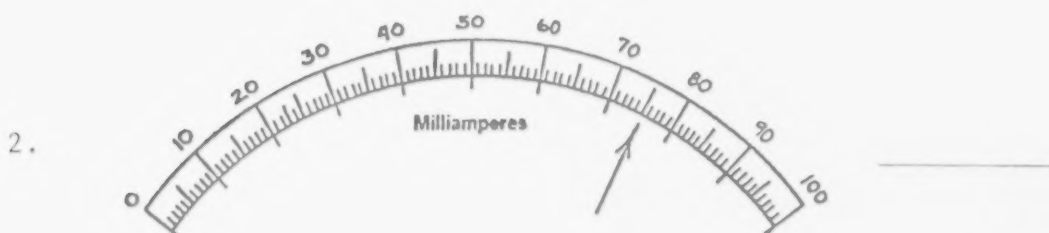
There are other ammeter scales. Some read whole amperes. Some go from 0 to 10 MA, some go from 0 to 1 MA. You will learn to read these scales when you go on in your study of Electricity.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-18C

NAME _____ CLUSTER _____ DATE _____

READ EACH AMMETER SCALE BELOW AND WRITE THE CORRECT MILLI-AMPERE (MA) READING IN THE SPACE TO THE RIGHT.



- I. JOB TITLE: Reading a Multimeter
- II. JOB DESCRIPTION: Reading different scales on a Volt - Ohm - Milliometer.
- III. INFORMATION NEEDED: Study work sheet B-19A.
- IV. MATERIALS NEEDED: Work sheets B-19A, B-19B; pencil.
- V. TASK: Complete work sheet B-19B.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$1.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Multimeter - found in cabinet.
 - B. Work sheet B-19

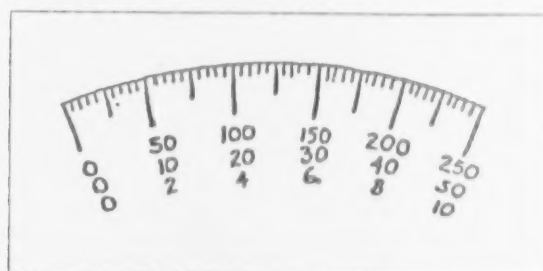
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-19A

NAME _____ CLUSTER _____ DATE _____

A multimeter is a combination ammeter, voltmeter, and ohmmeter. It is used to measure AC and DC voltages, currents, and resistances. Another name is Volt-Ohm-Milliammeter (VOM).

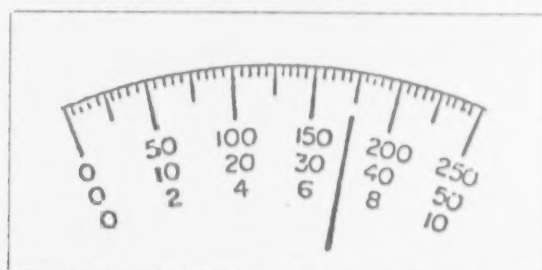
Below is one kind of multimeter scale. It has three ranges, 0-10, 0-50, 0-250.



MULTIMETER SCALE

This one scale can measure AC and DC voltage and current just by setting the **FUNCTION SELECTOR SWITCH** on the front of the meter to the proper position. Of course, the meter has to be connected properly to the circuit.

Below is a multimeter scale with its needle in position. Can you read the three ranges in volts?



1. What is the reading on the 0-10 range? _____
2. What is the reading on the 0-50 range? _____
3. What is the reading on the 0-250 range? _____

Answers:

1. The 0 to 10 range: 7 volts
2. The 0 to 50 range: 35 volts
3. The 0 to 250 range: 175 volts

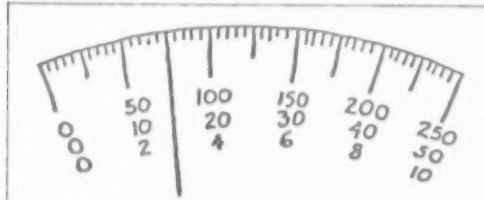
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-18B

NAME _____ CLUSTER _____ DATE _____

LOOK AT EACH MILLIMETER SCALE BELOW AND WRITE THE CORRECT READINGS IN THE SPACES:

A.

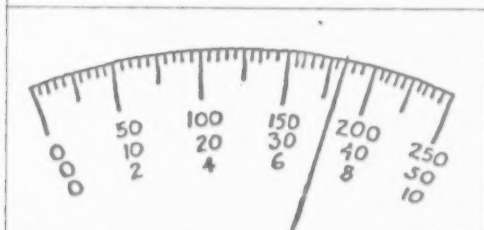


A. 0-10 RANGE _____

0-50 RANGE _____

0-250 RANGE _____

B.

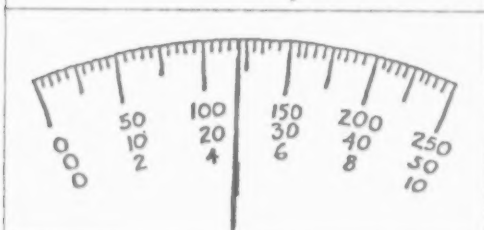


B. 0-10 RANGE _____

0-50 RANGE _____

0-250 RANGE _____

C.

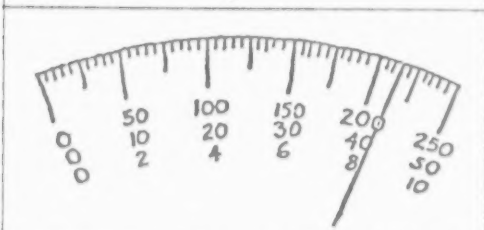


C. 0-10 RANGE _____

0-50 RANGE _____

0-250 RANGE _____

D.

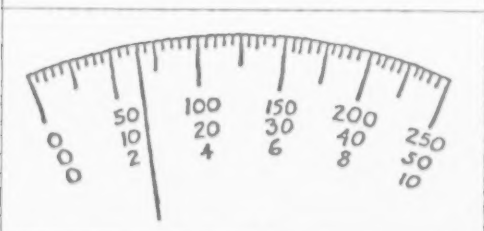


D. 0-10 RANGE _____

0-50 RANGE _____

0-250 RANGE _____

E.

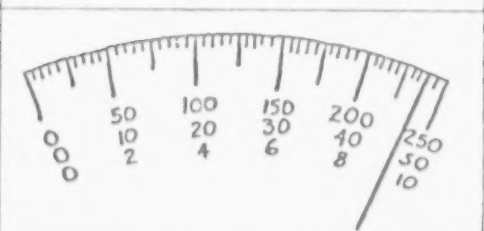


E. 0-10 RANGE _____

0-50 RANGE _____

0-250 RANGE _____

F.



F. 0-10 RANGE _____

0-50 RANGE _____

0-250 RANGE _____

- I. JOB TITLE: Watts and Kilowatts
- II. JOB DESCRIPTION: Finding wattage of an appliance.
- III. INFORMATION NEEDED: Study work sheets B-20A and B-20B.
- IV. MATERIALS: Work sheets B-20A, B-20B, B-20C; pencil.
- V. TASK: Complete work sheet B-20C.
- VI. QUALITY CONTROL: Take work sheet to supervisor.
- VII. PAY: \$2.00
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Stein's Refresher Mathematics
 - 1. Gas, Electricity, water heating - pg. 554
 - B. Work sheet B-20

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-20A

NAME _____ CLUSTER _____ DATE _____

Power is the rate of doing work - the amount of work that can be done by something in a certain amount of time.

A watt is the unit of electric power.

One watt is the power used when 1 amp of current is forced through a circuit by pressure of 1 volt.

The formula for finding watts is -



P = watts (power)

I = amperes

E = volts

This "pie" formula is used just like the pie with E, I, and R in it. Review that now.

The kilowatt is the unit used to measure large amounts of electrical power.

One kilowatt = 1000 watts

Examples:

1. A soldering iron uses 5 amps of current at 110 volts. How much power does it use?

$$P = I \times E$$

$$P = 5 \times 110$$

$$P = 550 \text{ watts (Answer)}$$

2. How much power does an electric range (stove) use if it takes 35 amps of current at 220 volts?

$$P = I \times E$$

$$P = 35 \times 220$$

$$P = 7,700 \text{ watts (Answer)}$$

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-20B

NAME _____ CLUSTER _____ DATE _____

3. How many kilowatts does the range in problem 2 use?

There are 1000 watts in 1 kilowatt. To find the number of kilowatts, we divide the number of watts by 1000.

$$\begin{array}{r} 7.7 \\ 1000 \overline{) 7700.0} \\ \underline{7000} \\ 7000 \\ \underline{7000} \end{array} \quad 7.7 \text{ kw (Answer)}$$

4. The nameplate on a toaster says that it is rated at 935 watts. At 110 volts, how much current will the toaster use?

The formula for current is:

$$I = \frac{P}{E}$$

$$I = \frac{935}{110}$$

$$\begin{array}{r} 8.5 \\ 110 \overline{) 935.0} \\ \underline{880} \\ 550 \\ \underline{550} \end{array}$$

$$I = 8.5 \text{ amps (Answer)}$$

REMEMBER THE THREE FORMULAS YOU WILL HAVE TO USE:

$$P = I \times E$$

$$I = \frac{P}{E}$$

$$E = \frac{P}{I}$$

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # B-20C

NAME _____ CLUSTER _____ DATE _____

1. An iron uses 15 amps at 110 volts. How many watts does it use? _____
2. How many amps of current will a clothes dryer use at 220 volts if its wattage rating is 1540 watts?

3. A 20% watt appliance uses 9.5 amps of current. What voltage will it draw? _____
4. An air conditioner with a voltage rating of 2508 watts uses 220 volts of electricity. How many amps of current will it use? _____
5. An appliance is marked with a wattage rating of 1045 watts. It draws 8.5 amps at 110 volts. Was the wattage rating correct? _____ If not by how much was it off? _____
6. What voltage will a 902 watt appliance draw at 8.2 amps? _____
7. Find the wattage rating of 3 appliances (at home or at school). What amperage will each use at 110 volts?

	Appliance	Wattage Rating	Amperage
1)	_____	_____	_____
2)	_____	_____	_____
3)	_____	_____	_____

8. Convert each wattage to kilowatts:

- A) 3,400 watts = _____ kilowatts
- B) 12,700 watts = _____ kilowatts
- C) 9,420 watts = _____ kilowatts

- I. JOB TITLE: Thermometer Reading
- II. JOB DESCRIPTION: Reading thermometers to the nearest tenth of a degree.
- III. INFORMATION NEEDED:
 - 1. To read an outside thermometer look at the top of the red or black column of mercury.
 - 2. To read an oral thermometer, see work sheets H-1A and H-1B.
- IV. MATERIALS NEEDED: 1 outside thermometer; 3 oral thermometers; work sheet H-1A, H-1B, H-1C.
- V. TASK: Complete work sheet H-1C
- VII. PAY: \$1.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Medications & Mathematics for the Nurse
 - 1. Fahrenheit to Celsius
 - 2. Celsius to Fahrenheit
 - B. Work sheet H-1A, H-1B, H-1C

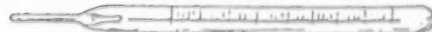
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-1A

NAME _____ CLUSTER _____ DATE _____

Measuring Oral Temperature

1. Wash your hands. Inform the patient you are there to take his/her temperature. Check the I.D. band to be certain you have the correct patient. Determine if the patient's condition is such that he/she may safely use an oral thermometer. If not, a rectal or axillary temperature reading may be necessary.
2. Some hospitals provide each patient with his/her own thermometer on admission. If none is provided in the room, obtain one from supply. Thermometers stored in an antiseptic solution must always be rinsed under cold water before use. Never rinse a thermometer in hot water as it causes the mercury to expand and may break the thermometer. If an electric thermometer is available, assemble the monitoring kit together with a supply of disposable covers for the probe. Position a clean cover on the probe and press the on button. Allow the machine to warm up before using.
3. If the mercury level is above 96°F shake it down.



Glass Oral Thermometer



Shake
Mercury Down

4. To shake down the mercury hold the top end of the thermometer between the right thumb (or left thumb) and index finger and shake the thermometer in a quick downward motion with a snap of the wrist. Shake down to 96°F or less.
5. Ask the patient to open his/her mouth and place the thermometer under the tongue with the projecting end to one side of the mouth. Explain to the patient that the lips must be kept tightly closed to prevent cool air from entering the mouth effecting the temperature reading.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-1B

NAME _____ CLUSTER _____ DATE _____

6. If a glass thermometer is being used do not remove it for 3 to 5 minutes. Inform the patient not to bite down on a glass thermometer because crushing the glass would release the mercury and could result in the patient swallowing broken glass or mercury.



7. When you are ready to remove the thermometer, handle it as you did when inserting it in the patient's mouth (hold by the top between the thumb and index finger). Dry the thermometer with a tissue, starting at the top and wiping towards the bottom to avoid getting saliva from the patient's mouth on your fingers.

8. When you read the thermometer hold it at eye-level and slowly turn it toward you until you can see the (red) mercury level. The long lines on the scale represent a full degree. The short lines in between represent $\frac{2}{10}$ of a degree. Only even numbered degrees are numbered (96° , 98° , 100° , etc.). Note the section of thermometer scale shown below. If the mercury level is three short strokes above 98° the temperature reading would be 98.6° F.



9. Check the thermometer. If it is broken, or not functioning properly, notify your superior and replace it. Remember to shake down the thermometer to 96° degrees Fahrenheit so it will be ready for use the next time temperatures are taken. Return the thermometer to its holder. Always wash your hands before and after taking temperatures.
10. Immediately after taking the patient's temperature make a note of the reading. This reading will be entered in the patient's chart.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-1C

NAME _____ CLUSTER _____ DATE _____

I. OUTSIDE THERMOMETER READING _____

II. ORAL THERMOMETERS

TAKE YOUR OWN TEMPERATURE WITH EACH OF THE THERMOMETERS FOR VARYING LENGTHS OF TIME.

Thermometer	Minutes In Mouth	Time In	Time Out	Degrees
1	2 minutes			
2	3 minutes			
3	4 minutes			

- I. JOB TITLE: Pulse Beats
- II. JOB DESCRIPTION: Counting Pulse Beats and Recording them.
- III. INFORMATION NEEDED: Study work sheet H-2A to review how to take a pulse.

Remember:

60 minutes = 1 hour

24 hours = 1 day

365 days = 1 year

- IV. MATERIALS NEEDED: Work sheets H-2A and H-2B; clock with second hand; pencil.
- V. TASK: Complete work sheet H-2B
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES.

A. Medications & Mathematics for the Nurse

1. Fahrenheit to Celsius

2. Celsius to Fahrenheit

B. Work sheet H-2A and H-2B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-2A

NAME _____ CLUSTER _____ DATE _____

Taking the Pulse

The object of taking a pulse is to determine the rate, or number of beats per minute; the force of the pulse beat, regular or irregular, strong or weak; and the rhythm of the beats. A normal pulse rhythm has a space or interval between beats.

Equipment

You will need a watch with a second hand, a pad and pen to note your findings. An apical pulse requires the use of a stethoscope.

The stethoscope is an instrument used to carry the sounds produced by the heart, lungs, intestines, etc. to the ear of the examiner. The stethoscope is simply a Y-shaped rubber tube with earpieces fitted on either side of the Y at the top and a flat disc or cone diaphragm at the bottom of the Y. When using either the cone-shaped or disc-type stethoscope, the flat diaphragm side goes against the skin of the patient.

Always cleanse both the disc and earpieces with an antiseptic solution after using the stethoscope. Ear infections can be contracted or transmitted if equipment which comes in contact with the skin are not properly cleansed.

Measuring Radial Pulse Rate

Always wash your hands before and after coming in contact with the patient. Check the patient's I.D. band and inform him/her that you are going to measure the pulse rate. With the patient's hand palm down, either across the chest or on the bed, place your three middle fingertips lightly on the radial artery. This can be located by following a line from the thumb to a point approximately one inch below the wrist bone. Observe the second hand of your watch and count the beats for 60 seconds. While counting the pulse beats note whether the beat is regular, irregular, weak or strong. Any gross abnormality should be reported to your supervisor.

Average Pulse Rates:

Adult Females	76-80 beats per minute
Adult Males	72 beats per minute
Infants	115-130 beats per minute

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-2B

NAME _____ CLUSTER _____ DATE _____

1. Find your pulse to nearest second.
2. Write below the time you plan to begin to take pulse.
3. Count beats carefully until minute is up.
4. Write down number of beats counted and time to nearest second counting was completed.
5. Compute how many times your pulse will beat in an hour, a day and a year.

TIME COUNTING BEGINS

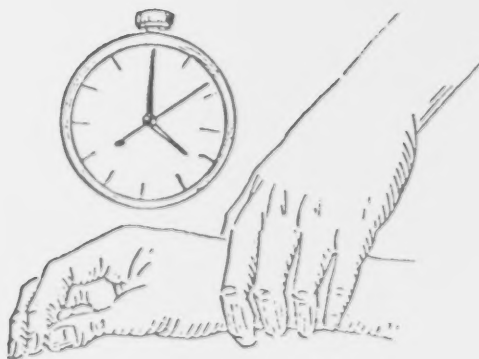
TIME COUNTING FINISHES

NUMBER OF BEATS PER MINUTE

NUMBER OF BEATS PER HOUR

NUMBER OF BEATS PER DAY

NUMBER OF BEATS PER YEAR



- I. JOB TITLE: Graphing
- II. JOB DESCRIPTION: Recording temperature pulse and respiration information on a hospital clinical chart.
- III. INFORMATION NEEDED: Temperature, pulse, and respiration are taken and recorded every two hours. They are recorded on a chart in various colors to reflect the time of day.

Red = hours from 11 pm to 7 am

Blue or Black = hours from 7 am to 3 pm

Green = hours from 3 pm to 11 pm

- IV. MATERIALS NEEDED: Work sheets H-3A and H-3B; red, green and black (blue) pens.
- V. TASK: Use information on work sheet H-3A to complete work sheet H-3B.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics

1. Statistics

- a. Bar Graph - 523
- b. Line Graph - 524
- c. Circle Graph - 525
- d. Averages - 526
- e. Probability - 527
- f. Review - 528

B. Work sheet H-3A, H-3B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-3A

NAME _____ CLUSTER _____ DATE _____

Below you will find the temperature, pulse and respiration data for Victor Votech, taken on July 14, 1979. Record them on his clinical chart making sure to use the proper color pen.

hour	temperature	pulse	respirations
2 am	102.2	116	30
4 am	104.2	110	22
6 am	99.6	102	16
8 am	103.4	94	24
10 am	104.6	86	28
12 noon	101.2	92	18
2 pm	99.4	98	24
4 pm	98.6	104	30
6 pm	98.6	110	22
8 pm	100.2	96	30
10 pm	101.4	90	20
12 midnight	102.6	78	24

WORK SHEET # H-3B

VOTECH, VICTOR

[illegible]

- I. JOB TITLE: The Doctor's Appointment Schedule
- II. JOB DESCRIPTION: Scheduling a week of appointments for a doctor.
- III. INFORMATION NEEDED: On work sheet you will find a blank schedule for Doctor Smith for the week of April 2 to April 6. Basic information about her schedule is as follows:

Dr. Smith's office hours begin at 9 a.m. except on Mondays and Fridays when she is at the hospital all morning. Office hours end at 5 p.m. except on Wednesdays when she spends all afternoon at the hospital. Dr. Smith prefers to leave a two-hour break from 12 noon to 2 p.m. available for lunch, dictation, and emergency cases. Patients may be scheduled during this time, however, if no other time is available, Dr. Smith will make house calls after 5 p.m. on Tuesday and Thursday evenings until 9 p.m.

- IV. MATERIALS NEEDED: Work sheets H-4A, H-4B, H-4C and a pencil.
- V. TASK: Using the information on work sheet H-4A and H-4B complete work sheet H-4C.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:

A. Medical Office Procedures - Bredow

1. Dealing with Patients

- a. Telephone Procedures - 22
- b. Appointments - 32
- c. Meeting the Patient - 43
- d. Preparing Medical Records

B. Work sheets H-4A, H-4B & H-4C

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-4A

NAME _____ CLUSTER _____ DATE _____

Below is a list of 10 patients who need to be scheduled for the week of April 2 to April 6. Remembering the limitations of Dr. Smith's schedule, write the names of the patient's in the appropriate spaces on work sheet H-4C. The length of time needed for each appointment can be found on work sheet H-4B.

1. Mr. Ronald Count - New patient - Prefers Friday pm, late.
2. Mrs. Barbara Laker - Complete physical exam - Only available on Monday pm, late.
3. Mr. Billy Marger - Routine visit 3 days a week - Prefers same time each day for kidney problems.
4. Mrs. Ann Jabbit - Each receive allergy injections.
5. Eileen Jabbit - Every day.
6. Mr. Kalvin Deener - See Dr. every day for problem diabetis.
7. Mrs. Mickie Vazella - Is examined every day for heart problem.
8. Mrs. Mary Black - Shut in, has a house visit two nights a week at 5 pm.
9. Betsey Smith - Comes Tuesday and Thursday afternoon for visits for rheumatic heart disease.
10. Barry White - Comes every day possible at 3:30 pm for acne and weight problems.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-4B

NAME _____ CLUSTER _____ DATE _____

Below are the predetermined times and charges for each kind of visit.

KIND OF VISIT	TIME NEEDED	CHARGE
FIRST VISIT	1 HOUR	25.00
COMPLETE PHYSICAL WORK-UP	1 HOUR	25.00
SCHEDULED INJECTIONS	15 MINUTES	15.00
ROUTINE APPOINTMENTS	30 MINUTES	15.00
HOUSE CALLS (TRAVELING TIME INCLUDED)	1 HOUR	20.00
E.K.G.		35.00
X-RAY		25.00
BLOOD TEST		10.00
URINALYSIS		10.00
OTHER TESTS WILL NOTE CHARGES INDIVIDUALLY		

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-4C

NAME _____ CLUSTER _____ DATE _____

DAYS: April 2 - April 6

TIMES	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
9 00					
9 15					
9 30					
9 45					
10 00					
10 15					
10 30					
10 45					
11 00					
11 15					
11 30					
11 45					
12 00					
12 15					
12 30					
12 45					
1 00					
1 15					
1 30					
1 45					
2 00					
2 15					
2 30					
2 45					
3 00					
3 15					
3 30					
3 45					
4 00					
4 15					
4 30					
4 45					
5 00					
6 00					

- I. JOB TITLE: Charges
- II. JOB DESCRIPTION: Figuring daily and weekly charges for a doctor's appointments and visits.
- III. INFORMATION NEEDED: In Job Number H-4 you set up appointments for Doctor Smith. Note the reason for which each appointment was scheduled and her usual charge for this service. (work sheet H-4B)
- IV. MATERIALS NEEDED: Work sheet H-4B, completed work sheet H-4C and pencil.
- V. TASK: Complete work sheet H-5
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$1.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
 - A. Medical Office Procedures
 - a. Billing the patient
 - b. Health Insurance
 - c. Keeping financial records
 - d. Medical Law
 - B. Work sheet H-4B - H-4C

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-5

NAME _____ CLUSTER _____ DATE _____

Look at the appointment sheet (H-4C) you worked up for Dr. Smith. Now check the charges for services (H-4B) and write the appropriate amount next to each name on the appointment sheet. Fill in the information below. Does the total for patients equal the total for week?

PATIENT'S NAME	TOTAL VISITS	TOTAL CHARGES
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

TOTAL FOR PATIENTS _____

DATE	TOTAL CHARGES
MONDAY, APRIL 2	
TUESDAY, APRIL 3	
WEDNESDAY, APRIL 4	
THURSDAY, APRIL 5	
FRIDAY, APRIL 6	

TOTAL FOR WEEK _____

- I. JOB TITLE: Daily Earnings
- II. JOB DESCRIPTION: Recording charges, payment received from visits and tests, and checks received by mail on the Daily Earning Record.
- III. INFORMATION NEEDED: Work sheets from Jobs H-4 and H-5 will provide information for the charges made for Dr. Smith's services on Monday, April 2.

Additional checks received in the mail were:

Alan Irving	\$ 25.00
Eleanor Egle	\$ 75.00
Doris Jones	\$ 30.00
Les Wool	\$120.00

- IV. MATERIALS NEEDED: Work sheets H-4C and H-5, pencil and work sheet H-6.
- V. TASK: Complete Daily Earnings Record on work sheet H-6.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$1.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- Same as H-5

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-6

NAME _____ CLUSTER _____ DATE _____

DAILY EARNINGS RECORD 19

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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CLUSTER HEALTH ARTS

JOB NUMBER H-7

- I. JOB TITLE: Bank Deposits
- II. JOB DESCRIPTION: Making out a bank deposit slip.
- III. INFORMATION NEEDED: Check work sheet H-6 to learn the amount of checks and cash received on April 2.
Dr. Smith's account number is 987-1-012345.
- IV. MATERIALS NEEDED: Work sheet H-6 and H-7A and pencil
- V. TASK: Complete work sheet H-7A
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
Same as H-6

WORK SHEET # H-7A

NAME	CLUSTER	DATE
------	---------	------

CUSTOMER'S RECEIPT

REGULAR CHECKING

City Guaranty Trust Company

ALL DEPOSITS ACCEPTED SUBJECT TO THE CONDITIONS
STATED ON THE REVERSE SIDE OF THIS DEPOSIT SLIP

		DOLLARS	CENTS
BILLS			
COINS			
CHECKS	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
	13		
	14		
TOTAL			

Date _____

FOR THE ACCOUNT OF

(please print)

[illegible]

- I. JOB TITLE: Measuring Liquids
- II. JOB DESCRIPTION: Measuring liquid in marked containers and comparing quantities.
- III. INFORMATION NEEDED: Study work sheet H-8A. Know the meaning of: CC., ML., TBS., OZ., DR., TSP.

Be familiar with the names of various containers and how they are divided. (Work sheet H-8B)
- IV. MATERIALS NEEDED: Medicine cup, graduates, beakers, container of water, work sheets H-8A, H-8B, H-8C and pencil.
- V. TASK: Complete work sheet H-8C.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Medications & Mathematics For The Nurse
 - 1. Calculating of Doses & Solutions - 28
 - a. Symbols & Measurement - 35
 - b. Methods of Calculating Dosages - 41
 - c. Problems In Solutions - 45
 - d. Calculating Children's Dosages - 48
 - B. Work sheet H-8A

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-8A

NAME _____ CLUSTER _____ DATE _____

Drop (gtt.) = approximate liquid measure depending on kind of liquid measured and the size of the opening from which it is dropped.

60 drops 1 teaspoon (tsp.)
 1 dash Less than 1/8 teaspoon
 4 teaspoons 1 tablespoon (tbsp.)
 2 tablespoons 1 ounce (oz)
 4 ounces 1 juice glass
 6 ounces 1 teacup
 8 ounces 1 glass
 16 tablespoons or 8 ounces 1 measuring cup (c.)
 2 cups 1 pint (pt)
 2 pints 1 quart (qt)
 4 quarts 1 gallon (gal)

Figure 6-3 Common Household Measures

HOUSEHOLD	METRIC (Dry)	APOTHECARIES'
	= 0.060 gram or 60 milligrams	= 1 grain
1/8 teaspoon	= 0.5 gram (Gm)	= 7½ grains
1/4 teaspoon	= 1.0 gram	= 15 grains
1 teaspoon TSP.	= 4 grams	= 60 grains or 1 dram
1 tablespoon TBL.	= 15 grams	= 4 drams
2 tablespoons	= 30 grams	= 1 ounce
2.2 pounds	= 1 kilogram	

Figure 6-4 Equivalent Dry Measures

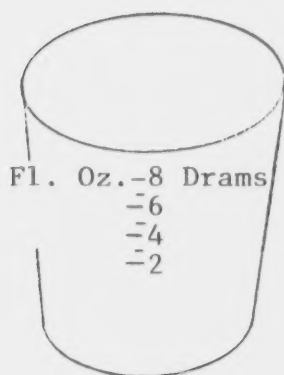
HOUSEHOLD	METRIC (Liquid)	APOTHECARIES'
1 drop (gtt.)	= 0.060 milliliter ML.	= 1 minim
15 drops	= 1 milliliter (1 cubic centimeter) CC.	= 15 minims
1 teaspoon (tsp)	= 4 milliliters	= 1 fluid dram DR
1 dessert spoon (Dssp)	= 8 milliliters	= 2 fluid drams
8 teaspoons or 2 tablespoons (tbsp.)	= 30 milliliters	= 1 fluid ounce
1 juice glass	= 120 milliliters	= 4 fluid ounces
2 measuring cups	= 500 milliliters	= 1 pint
4 measuring cups	= 1000 milliliters or 1 liter	= 1 quart or 2 pints

Equivalent Liquid Measures

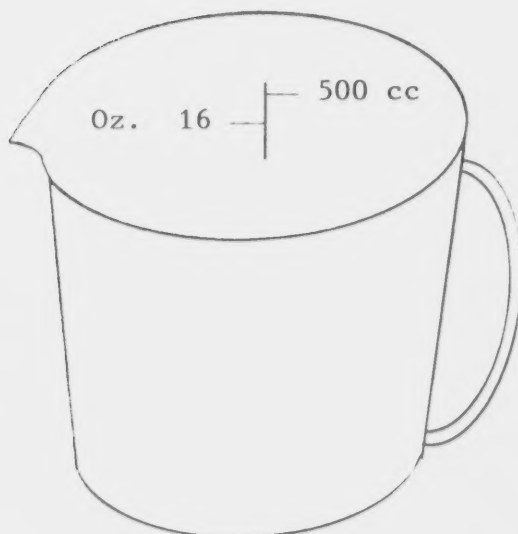
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-8B

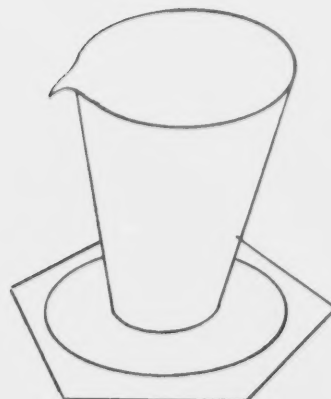
NAME _____ CLUSTER _____ DATE _____



Medicine Cup
(Plastic)



Graduate
(Metal)



Beaker
(Glass or Plastic)
Varied Sizes

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-8C

NAME _____ CLUSTER _____ DATE _____

1. Fill medicine cup with water to 1/2 oz.

What does 1/2 oz. equal in cc _____

ml _____

dr _____

2. Fill graduate with water to 10 oz.

What does 10 oz. equal in cc _____

3. Fill beaker with water to 15 ml.

What does 15 ml equal in oz. _____

dr. _____

CLUSTER HEALTH ARTS

JOB NUMBER H-9

- I. JOB TITLE: Equivalent Measurements
- II. JOB DESCRIPTION: Checking to see if you remember equivalent measurements.
- III. INFORMATION NEEDED: Complete job sheet H-8. Review liquid measure equivalents.
- IV. MATERIALS NEEDED: Job sheet H-8, work sheet H-9A and pencil.
- V. TASK: Complete work sheet H-9A. Review if you do not get them all correct.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
 - A. Medications & Mathematics For Nurses
 - 1. Calculating Doses & Solutions - 18
 - 2. Symbols & Measurement - 35
 - 3. Methods of Calculating Dosages - 41
 - 4. Problems in Solutions - 45
 - 5. Calculating Children's Dosages - 48
 - B. Work sheet H-9

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # H-9A

NAME _____ CLUSTER _____ DATE _____

1. Give the definition for:

1. cc.
2. tsp.
3. Dssp.
4. Tsp.
5. ml.
6. oz.
7. Dr.
8. C.
9. pt.

2. Fill in the appropriate equivalent measurements.

1/2 oz = _____ cc = _____ ml = _____ dr = _____ Tbs.

1 oz = _____ cc = _____ ml = _____ dr = _____ Tbs.

2 C. = _____ oz = _____ ml = _____ pt = _____

8 oz = _____ oz = _____ ml = _____ pt = _____ Tbs.

- I. JOB TITLE: The Ruler
- II. JOB DESCRIPTION: Reading the Markings on a Ruler
- III. INFORMATION NEEDED: The basic tool of all measurement is the ruler. You should know the names of all the marks on the ruler and how to write those names as fractions.
- IV. MATERIALS NEEDED: Work sheet M-1; pencil.
- V. TASK: Complete sections A and B on work sheet M-1 using fractions to name -
 - A. All the lines on the one-inch ruler
 - B. All the points on a six-inch ruler indicated by arrows.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$3.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Stein's Refresher Mathematics
 - 1. Measuring & Drawing Line Segments - 309
 - 2. Compound numbers of 2 oz. more Denominations Fundamental Operations - pg. 420
 - B. The Ruler - Exercise In the Files
 - C. Work sheet M-1

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # M-1

NAME _____ CLUSTER _____ DATE _____

A.

a b c d e f g h i j k l m n o p

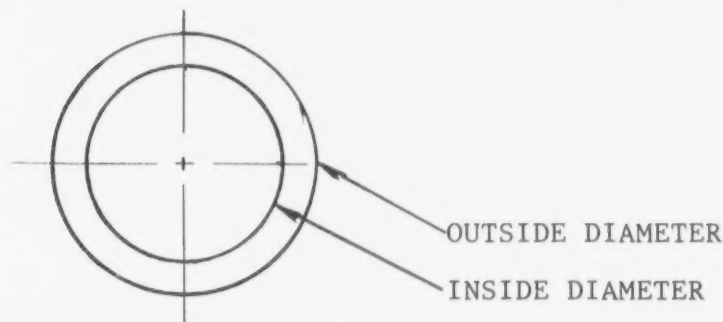
A =	E =	I =	M =
B =	F =	J =	N =
C =	G =	K =	O =
D =	H =	L =	P =

B.

A B C D E F G H I J K L M N O P Q R

a =	e =	i =	m =	q =
b =	f =	j =	n =	r =
c =	g =	k =	o =	
d =	h =	l =	p =	

- I. JOB TITLE: Pipe Measurement
- II. JOB DESCRIPTION: Measuring lengths and diameter of pipes.
- III. INFORMATION NEEDED: You should know how to measure the inside diameter and the outside diameter of a pipe.



- IV. MATERIALS NEEDED: Four pieces of pipe of differing lengths and diameters; one six-foot folding rule; work-sheet M-2A; pencil.
- V. TASK: Complete work sheet M-2A using the rule to measure to the nearest $\frac{1}{16}$ of an inch.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
 - 1. Changing Improper Fractions
 - 2. Changing mixed numbers to simplest form
 - 3. Changing a fraction to higher terms
 - 4. Comparing fractions
 - 5. Multiplication of fractions & mixed numbers
 - 6. Division of fractions & mixed numbers
 - B. S.R.A. Kit
 - C. Pipe measurement - Pipe in cabinet
 - D. Work sheet M-2A

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # M-2A

NAME _____ CLUSTER _____ DATE _____

PIPE #1

LENGTH _____

INSIDE DIAMETER _____

OUTSIDE DIAMETER _____

PIPE #2

LENGTH _____

INSIDE DIAMETER _____

OUTSIDE DIAMETER _____

PIPE #3

LENGTH _____

INSIDE DIAMETER _____

OUTSIDE DIAMETER _____

PIPE #4

LENGTH _____

INSIDE DIAMETER _____

OUTSIDE DIAMETER _____

- I. JOB TITLE: Pipe Measurement
- II. JOB DESCRIPTION: Measuring pipe with fittings.
- III. INFORMATION NEEDED: After measuring pipe (see M-1 and M-2). Screw elbows onto pipe hand-tight so that they can be removed. See the drawing in Job M-3 for information about end and center measurement.
- IV. MATERIALS NEEDED:
- 1) One length 3/4" pipe
 - 2) Two 3/4" pipe elbows
 - 3) One 6" rule
 - 4) Work sheet M-2B
 - 5) Pencil
- V. TASK: Complete work sheet M-2B
- 1) Measure length of pipe
 - 2) Screw elbow on one end and measure end to center
 - 3) Screw elbow on other end and measure center to center
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Plumbing - Installation & Design - L.V. Ripka - pg. 29
- 1) Plumbing Materials
 - a. Cast iron soil pipe and fittings
 - b. Galvanized steel pipe and threaded fittings
 - c. Plastic pipe and fittings
 - d. Uses of piping materials
 - e. Plumbing valves
 - f. water meters
- B. Work sheet M-2B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

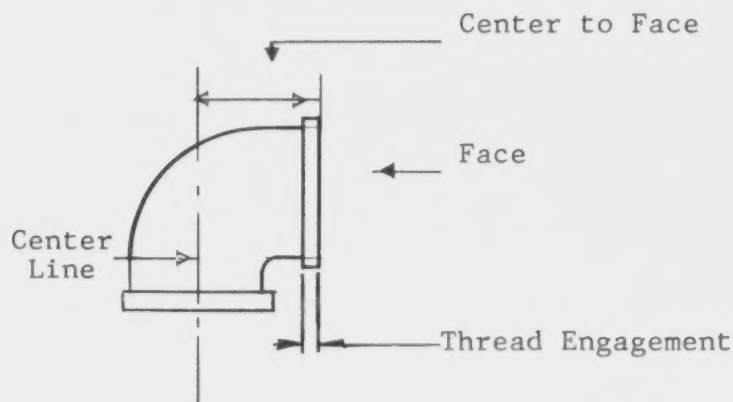
WORK SHEET # M-2B

NAME _____ CLUSTER _____ DATE _____

- 1) LENGTH OF PIPE _____
- 2) LENGTH FROM END TO CENTER _____
- 3) LENGTH FROM CENTER TO CENTER _____

- I. JOB TITLE: Fitting Allowance
- II. JOB DESCRIPTION: Computing the fitting allowance for pipe elbows.
- III. INFORMATION NEEDED: Complete jobs M-1, M-2A, and M-2B to review measuring techniques.

Fitting Allowance = Center TO face minus thread engagement.



- IV. MATERIALS NEEDED: Four different sized pipe elbows; 6" folding ruler; work sheet M-3; pencil
- V. TASK: Find the fitting allowance for each elbow and record on work sheet M-3.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$3.20
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Plumbing - Installation & Design -L.V. Ripko -
pg. 29

1) Plumbing materials

- a. Cast Iron Soil pipe & fittings
- b. Galvanized steel pipe & threaded fittings
- c. Plastic pipe & fittings
- d. Uses of piping materials
- e. Plumbing valves
- f. Water meters

B. Work sheet M-3

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # M-3

NAME _____ CLUSTER _____ DATE _____

PIPE ELBOW

FITTING ALLOWANCE

#1

#2

#3

#4

- I. JOB TITLE: Finding Lengths
- II. JOB DESCRIPTION: Estimating the amount of pipe needed to go around a room.
- III. INFORMATION NEEDED:
Know how to total all the measurements when measuring lengths longer than the 6 foot rule. Know how to add fractions and how to combine feet and inches.
- IV. MATERIALS NEEDED: 6 foot folding rule; work sheet M-4; pencil
- V. TASK: Complete work sheet M-4. Total of all four walls will be amount of pipe needed to go around room.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$3.20
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Plumbing - Installation & Design
 - 1. Sizing of sanitary drainage & vent piping pg. - 153
 - a. Single family homes
 - b. Two-story single family home
 - c. Duplex residence
 - d. Apartment building bathroom stack
 - e. Apartment - kitchen sink waste stack
 - f. Multi-story building bathroom stack
 - g. Two story industrial building
 - h. Two story office building
 - i. Review questions
 - B. Work sheet M-4
 - C. S.R.A. Kit

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # M-4

NAME _____ CLUSTER _____ DATE _____

#4

#1

ROOM B - 5

WALL #1	_____
WALL #2	_____
WALL #3	_____
WALL #4	_____

TOTAL AMOUNT
OF PIPE NEEDED
TO GO AROUND
ROOM

#3

#2

- I. JOB TITLE: Balance of Measurement
- II. JOB DESCRIPTION: Computing the length of baseboard trim needed for room B-5, and figuring its cost.
- III. INFORMATION NEEDED:

The following lengths of baseboard radiators will be installed in the room:

WALL	#1	-	12'4"	of radiator
WALL	#2	-	7'0"	of radiator
WALL	#3	-	10'6"	of radiator
WALL	#4	-	8'8"	of radiator

After radiators are installed, baseboard trim has to be installed along each wall from end of each radiator to corner of each wall. Disregard doorways.

- IV. MATERIALS NEEDED: 6 foot folding rule; work sheet M-5; pencil
- V. TASK: Complete work sheet M-5
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$9.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Work sheet M-5

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # M-5

NAME _____ CLUSTER _____ DATE _____

LENGTH OF TRIM NEEDED FOR

COST FOR TRIM AT \$1.60
PER FOOT

WALL #1 _____

WALL #2 _____

WALL #3 _____

WALL #4 _____

TOTAL AMOUNT OF TRIM NEEDED FOR ENTIRE ROOM:

COST OF TRIM FOR ENTIRE ROOM IF TRIM COST \$1.60 PER FOOT:

- I. JOB TITLE: Area Management
- II. JOB DESCRIPTION: Computing areas of steel plate.
- III. INFORMATION NEEDED:
You find the area of a flat surface by multiplying the length times the width.
- IV. MATERIALS NEEDED: Four pieces of steel plate of different sizes; six foot folding rule; pencil.
- V. TASK: Complete work sheet M-6
 - A- Find the area of each piece of steel plate
 - B- Figure out the smallest size steel plate you could use to cut out the four pieces of plate you measured.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Work sheet M-6

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # M-6

NAME _____ CLUSTER _____ DATE _____

AREA

A. Plate #1 _____

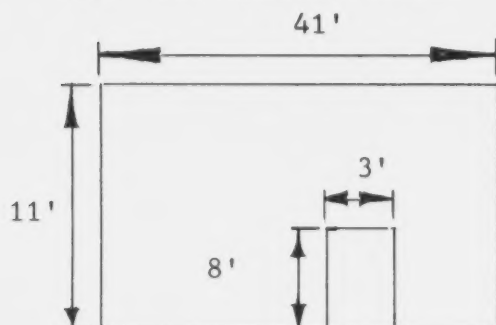
Plate #2 _____

Plate #3 _____

Plate #4 _____

B. Smallest size piece of steel plate that could be used
to cut out four pieces of plate already measured:

- I. JOB TITLE: Area Measurement for Insulation
- II. JOB DESCRIPTION: Finding the square feet of insulation needed to insulate a building wall.
- III. INFORMATION NEEDED: Example:



Wall measures 40' 8" times 11' 2". Round off dimensions to the nearest foot.

Area of wall = 41' x 11' = 451 square feet

Area of door = 8' x 3' = 24 square feet

Amount of insulation needed =
$$\begin{array}{r} 451 \\ -24 \\ \hline 427 \end{array}$$
 square feet

- IV. MATERIALS NEEDED: 6 foot rule; work sheet M-7; pencil
- V. TASK: Complete work sheet M-7
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: #3.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Work sheets M-7

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # M-7

NAME _____ CLUSTER _____ DATE _____

AREA OF WALL = LENGTH x WIDTH

AREA OF DOOR = LENGTH x WIDTH

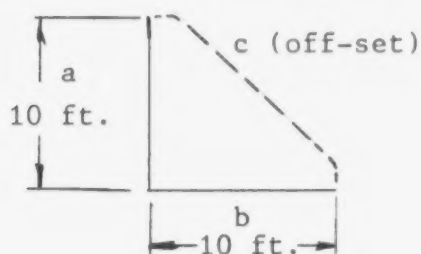
AMOUNT OF INSULATION NEEDED:

AREA OF WALL _____

AREA OF DOOR _____

INSULATION _____

- I. JOB TITLE: 45 Degree Off-Set
- II. JOB DESCRIPTION: Figuring the amount of pipe saved by a 45° off-set to go around an obstruction.
- III. INFORMATION NEEDED: To find the length of a 45° off-set piece, multiply the length of either side by 1.414



If side $a = 10$ ft. and side $b = 10$ ft.

$$10' \times 1.414 = 14.14 \text{ ft.}$$

Total needed to follow wall without off-set = $a + b$

$$10 + 10 = 20.00 \text{ ft.}$$

$$\text{Length of off-set} = \underline{14.14 \text{ ft.}}$$

$$\text{Amount saved} = 5.86 \text{ ft.}$$

- IV. MATERIALS NEEDED: Work sheet M-8; pencil
- V. TASK: Complete work sheet M-8
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Plumbing - Installation & Design - Ripka
1. Joining, Installing, & Supporting Pipe
- a. Cast iron soil pipe joints
 - b. Galvanized steel threaded joints
 - c. Copper tubing joints
 - d. Plastic pipe joints
 - e. Installing & supporting pipe
 - f. Review questions
- B. Work sheet M-8
- C. S.R.A. Kit

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

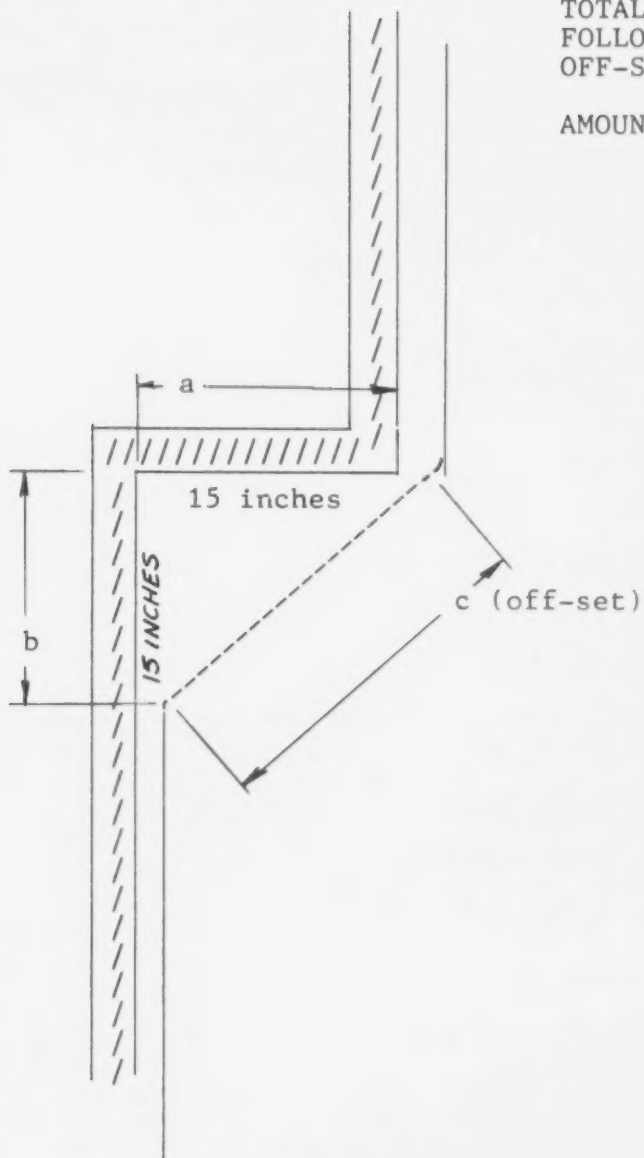
WORK SHEET # M-8

NAME _____ CLUSTER _____ DATE _____

LENGTH OF OFFSET = _____

TOTAL NEEDED TO
FOLLOW WALL WITHOUT
OFF-SET = _____

AMOUNT SAVED = _____



- I. JOB TITLE: Blueprint Reading I
- II. JOB DESCRIPTION: Converting drawing scale of 1 inch = 1 foot to job measurement.
- III. INFORMATION NEEDED:

- A) The drawing scale is located in the lower right hand corner of the drawing.
- B) On a scale of 1" = 1', a line one inch long on the drawing means a measurement of one foot on the job.
- C) Feet is written as ' and inches as "

Example: $1 \frac{3}{4}"$ SCALE
 $1" = 1'$

Measure the length of the line on the drawing and divide by the scale of the drawing (1)

$$1 \frac{3}{4}" \div 1 = 1 \frac{3}{4} \text{ feet}$$

When the job measurement comes out to a fraction the number of inches in $\frac{3}{4}$ feet is found by multiplying $\frac{3}{4} \times 12$ ($\frac{3}{4} \times 12/1 = 36/4 = 9$ ") The job measurement is 1' 9" long.

- IV. MATERIALS NEEDED: Ruler, work sheet M-9A; pencil
- V. TASK: Complete work sheet M-9A
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Plumbing Installation & Design - Ripka

1. Plumbing a house - 257
 - a. Blue prints
 - b. Specifications
 - c. Rough-in drawings
 - d. Plumbing permits
 - e. Installation of the rough plumbing
 - f. Location of the fixtures on the first floor & drilling the necessary holes.
 - g. Location of basement plumbing fixtures.
 - h. Layout of the building drain trench.
 - i. Installation of the building sewer & water service.
 - j. Installation of the finish plumbing

B. House Plans for chapter 12

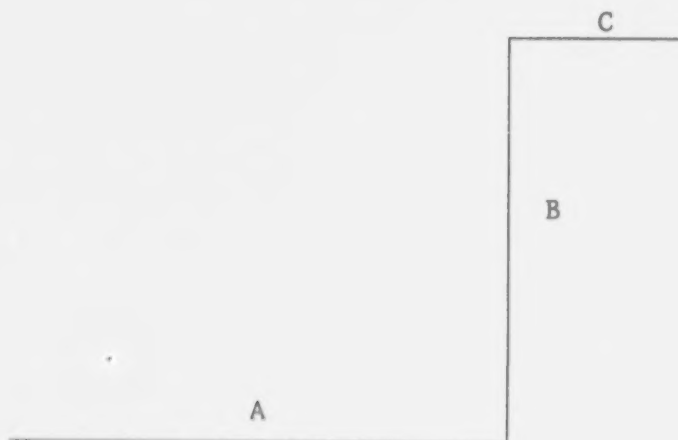
C. S.R.A. Kit

D. Work sheet M-9A -19-

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # M-9A

NAME _____ CLUSTER _____ DATE _____



SCALE

1" = 1 ft.

JOB MEASUREMENTS:

Line a = _____ feet

Line b = _____ feet

Line c = _____ feet

- I. JOB TITLE: Understanding Liquid Measure
- II. JOB DESCRIPTION: Using a table of common liquid measure.
- III. INFORMATION NEEDED:

A Table of Common Liquid Measure

3 teaspoons	=	1 tablespoon
2 tablespoons	=	1 fluid ounce
8 fluid ounces	=	1 cup
16 tablespoons	=	1 cup
3 cups	=	1 pint
16 fluid ounces	=	1 pint
2 pints	=	1 quart
3 quarts	=	1 gallon
8 pints	=	1 gallon

- IV. MATERIALS NEEDED: 1 bucket of water; 1 teaspoon; 1 tablespoon; 1 measuring cup; 1 pint container; 1 quart container; 1 gallon container; paper; pencil.
- V. TASK: Gather all materials and go to sink area to work. On the above Table of Common Liquid Measure two of the measurements are incorrect. Check each one by measuring. Is each statement correct? As you prove each one write it down on a work sheet. Indicate the two measurements that are incorrect and write the correct measurement on the paper.
- VI. QUALITY CONTROL: Call supervisor and have him/her check your results.
- VII. PAY: \$1.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCE:
- A. Teaspoon, tablespoon, measuring cup, pint container, quart container, gallon container.
- B. Stein's Refresher Mathematics
1. Measure of Volume - Basic Units - pg. 382

2. Practical Applications - Measuring Volume
- pg. 385
3. Capacity - Liquid Measure - pg. 391
4. Capacity - Dry Measure - pg. 396
5. Measure of Weight - pg. 400

C. Work sheet S-1

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-1

NAME _____ CLUSTER _____ DATE _____

- I. JOB TITLE: Liquid Measure
- II. JOB DESCRIPTION: Knowing Liquid Measures
- III. INFORMATION NEEDED: Complete Job S-1 and corrected Table of Common Liquid Measure
- IV. MATERIALS NEEDED: Quiz on liquid measure; pencil; Headcrusher
- V. TASK: Study the corrected Table of Common Liquid Measure used in Job S-1. When you are finished and think you know the table well, do the Quick Quiz on work sheet #S-2I. Do the Headcrusher on work sheet #S-2II.
- VI. QUALITY CONTROL: Take your work sheets to your supervisor to be checked.
- VII: PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCE
 - A. Teaspoon, tablespoon, measuring cup, pint container.
 - B. Stein's Refresher Mathematics
 - 1. Capacity - liquid measure - pg. 391
 - 2. Capacity - dry measure - pg. 396
 - 3. Measure of weight - pg. 400
 - C. Work sheet S-2 I & S-2 II

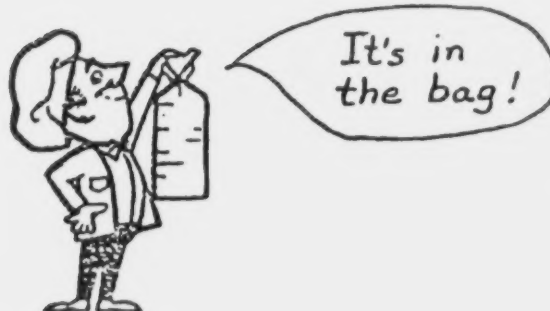
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-2 I

NAME _____ CLUSTER _____ DATE _____

QUICK QUIZ

1. How many ounces are in a pound? _____
2. How many fluid ounces are in a cup? _____
3. How many fluid ounces are in a quart? _____
4. How many tablespoons are in a fluid ounce? _____
5. How many fluid ounces are in a pint? _____
6. How many fluid ounces are in a half cup? _____
7. How many teaspoons are in a tablespoon? _____
8. How many fluid ounces are in $\frac{1}{4}$ cup? _____
9. How many ounces are in two pounds? _____
10. How many fluid ounces are in a pint? _____



SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-2 11

NAME _____ CLUSTER _____ DATE _____

A HEADCRUSHER

Here is a chart of measurements. Some of them are equal to others. Fill in the letters of any other measurements equal to those of the letters listed below.

ANSWERS

1



4 oz.

A



1/4 cup

1

2



1 pt.

B



2

3



3 cups

C



6 oz.

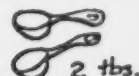
3

4



1 oz.

D



2 tbs.

4

5



1 qt.

E



5

6



2 pints

F



6

7



3/4 cup

G



1/2 cup

7

8



2 oz.

H



8

- I. JOB TITLE: Quantities in Liquid Measure
- II. JOB DESCRIPTION: Adding, subtracting, multiplying and dividing quantities in liquid measure.
- III. INFORMATION NEEDED: Complete jobs S-1 and S-2. Know how to add, subtract, multiply and divide whole numbers.
- IV. MATERIALS NEEDED: Work sheet #S-3, pencil.
- V. TASK: Complete work sheet #S-3.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80.
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Stein's Refresher Mathematics
 - 1. Capacity - Liquid Measure - pg. 391
 - 2. Capacity - Dry Measure - pg. 397
 - B. Pint Jar, Gallon Container, Quart Container, Cup.
 - C. Work sheet S-III

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-3

NAME _____ CLUSTER _____ DATE _____

QUANTITIES IN LIQUID MEASURE

ASSIGNMENT:

1. How many pints are there in a gallon?
2. How many ounces in a gallon?
3. How many pint bottles will Mr. Martinez need for 25 gallons of shampoo? How much will he receive if he sells them all at \$0.75 a pint?
4. If a formula calls for 20 ozs. of water, how can you measure it in a cup marked only in quarters and thirds of a cup?
5. Find the number:

a. Of pints in:	5 qt.	3.5 qt.	4 gal.
b. Of quarts in:	3 gal.	2.5 gal.	6 gal. 1 qt.
c. Of cups in:	5 pt.	3 qt.	2.5 gal.
d. Of quarts in:	9 pt.	14 pt.	17 pt.
e. Of gallons in:	10 qt.	15 qt.	33 pr.
6. One quart of shampoo is lost daily in a beauty salon through carelessness.
 - a. What is the cost of the wasted shampoo if a gallon cost \$1.75?
 - b. How many quarts are wasted in a week?
7. If it takes 5 ozs. of cleaning fluid to cleanse a wig, how many ounces will it take to clean 8 wigs? How many pints will it take?

- I. JOB TITLE: Making Correct Change
- II. JOB DESCRIPTION: Calculating correct change to give to customer at time a sale is made.
- III. INFORMATION NEEDED: The following units of money are equivalent:

5 pennies	=	1 nickel
2 nickels	=	1 dime
10 dimes	=	1 dollar
5 nickels	=	1 quarter
2 quarters	=	1 half-dollar
4 quarters	=	1 dollar
2 half-dollars	=	1 dollar

- IV. MATERIALS NEEDED: Work sheets S-4a I and S-4a II; pencil.
- V. TASK: Work sheet S-4a I: fill in the blanks; work sheet S-4a II: fill in the blanks showing change that should be given in the least number of coins or bills possible.
- Example: If the required change were 35¢ you should not give 3 dimes and 1 nickel nor 1 quarter, 1 nickel and 5 pennies. You should give 1 quarter and 1 dime.
- VI. QUALITY CONTROL: Take work to supervisor to be checked.
- VII. PAY: \$2.40

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:

- A. Math Principles For Food Service Occupations
Haines
1. Part III - Service crew-operational procedures. Pg. 95- 113
 - a. Sales checks
 - b. Blank checks
 - c. Partly printed checks
 - d. Sales Tax

2. Tipping and cashier's daily work sheet
pg. 114 - 122

- a. Tipping
- b. Cashier's daily work sheet

B. Cash Register - obtained from D.E. Shop

C. Stein's Refresher Mathematics - pg. 553 - making change.

D. Work sheet S-4a I and S-4a II

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4a I

NAME _____ CLUSTER _____ DATE _____

- | | | | | |
|-----|-----------------|---|-------|-------|
| 1. | 20 nickels | = | _____ | cents |
| 2. | 65 dimes | = | _____ | cents |
| 3. | 98 quarters | = | _____ | cents |
| 4. | 200 nickels | = | _____ | cents |
| 5. | 31 half-dollars | = | _____ | cents |
| 6. | 17 nickels | = | _____ | cents |
| 7. | 35 quarters | = | _____ | cents |
| 8. | 27 dimes | = | _____ | cents |
| 9. | 127 pennies | = | _____ | cents |
| 10. | 73 half-dollars | = | _____ | cents |

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4a II

NAME _____ CLUSTER _____ DATE _____

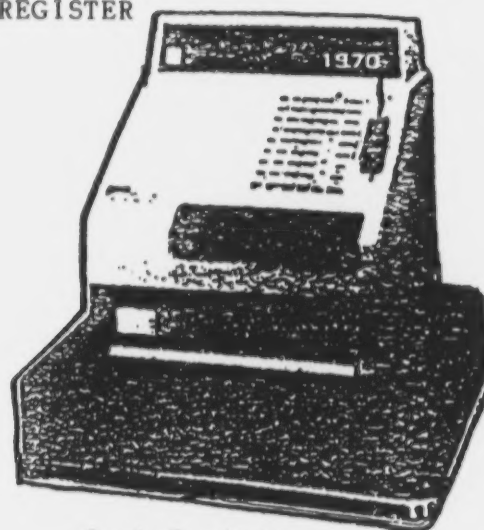
	Sales Slips	Tendered	1¢	5¢	10¢	25¢	50¢	\$1.00	\$5.00	\$10.00	Total Change
1.	89¢	20.00									
2.	36¢	10.00									
3.	1.74	5.00									
4.	1.96	5.00									
5.	2.05	20.00									
6.	2.77	10.00									
7.	3.29	5.00									
8.	3.67	10.00									
9.	4.36	10.00									
10.	5.18	10.00									
11.	5.55	20.00									
12.	6.76	20.00									
13.	6.88	10.00									
14.	7.91	20.00									
15.	7.43	10.00									
16.	8.16	10.00									
17.	8.49	10.00									
18.	9.30	20.00									
19.	15.67	20.00									
20.	18.79	20.00									

- I. JOB TITLE: Cash Register
- II. JOB DESCRIPTION: Learning how to determine what coins and bills make up the total amount in the cash register.
- III. INFORMATION NEEDED: Review denominations of money and become familiar with the cash register and cash check-in slips which show you how much money is in the register at the beginning of the day.
- IV. MATERIALS NEEDED: Information about cash register; work sheets S-4B I to S-4B X; pencil.
- V. TASK: Review information about the cash register. Fill in work sheets S-4B I to S-4B II making sure that the total cash at the bottom equals the amount given at the top of the page. Work sheet S-4B I is completed for you as a sample.
- VI. QUALITY CONTROL: Take work sheets to your supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
 - A. Math Principles for Food Service Occupations
Haines - 114 - 122
 - 1. Tipping
 - 2. Cashier's daily worksheet
 - B. Cash Register - Obtained from D.E. Shop
 - C. Steins Refresher Mathematics - pg. 553 - making change.
 - D. Worksheet S-4B I, S-4B II, S-4B III, S-4B IV, S-4B V, S-4B VI, S-4B VII, S-4B VIII, S-4B IX, and S-4B X.

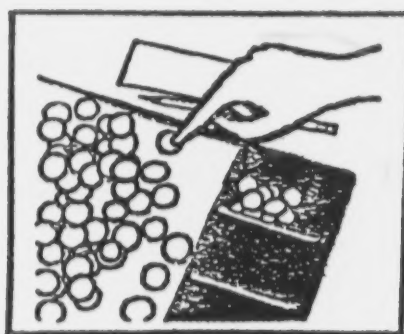
GETTING TO KNOW THE CASH REGISTER



1. Use cardboard when counting change into cash drawer.



Cash Register

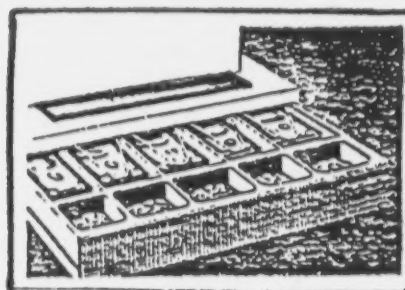


2. Count each denomination of coins separately and slide them into their proper compartments.



Doing it the right way!

3. Usual arrangement of coins and currency in cash drawer.



SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B 1

NAME _____ CLUSTER _____ DATE _____

YOU are given \$33.00 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want, as long as it comes out to \$33.00.

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER

Date	No.	Cash	
All Bills (ones)	16	1 6	0 0
Halves	13	6	5 0
Quarters	17	2	7 5
Dimes	60	6	0 0
Nickels	11		5 5
Pennies	120	1	2 0
NAME _____			
TIME _____		TOTAL 3 3 CASH	0 0



And away
we go!

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B 11

NAME _____ CLUSTER _____ DATE _____

YOU are given \$10.57 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want, as long as it comes out to \$10.57.

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER

Date	No.	Cash	
All Bills (ones)		5	0 0
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



And away we go!

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B III

NAME _____ CLUSTER _____ DATE _____

YOU are given \$56.36 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want, as long as it comes out to \$56.36.

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER

Date	No.	Cash	
All Bills (ones)		25	00
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B IV

YOU are given \$116.13 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want, as long as it comes out to \$116.13

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)		1 1	0 0
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



And away we go!

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B V

NAME _____ CLUSTER _____ DATE _____

YOU are given \$75.00 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want, as long as it comes out to \$75.00.

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)			
Halves		2 0	0 0
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



And away we go!

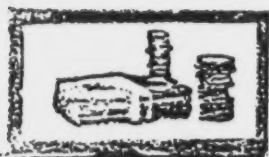
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B VI

NAME _____ CLUSTER _____ DATE _____

YOU are given \$65.00 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want, as long as it comes out to \$65.00.

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)		2 3	0 0
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



And away we go!

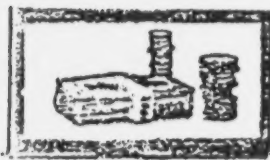
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B VII

NAME _____ CLUSTER _____ DATE _____

YOU are given \$19.50 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want, as long as it comes out to \$19.50.

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)		1 2	0 0
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



And away we go!

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B VIII

NAME _____ CLUSTER _____ DATE _____

YOU are given \$203.54 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want, as long as it comes out to \$203.54

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)		7 5	0 0
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



And away we go!

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4B IX

NAME _____ CLUSTER _____ DATE _____

YOU are given \$150.00 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want as long as it comes out to \$150.00.

Use today's date, your name, and the time.



DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)		1 0 0	0 0
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



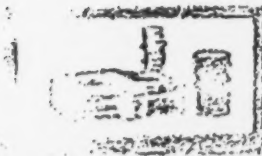
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-B X

NAME _____ CLUSTER _____ DATE _____

YOU are given \$86.68 to start the day's business. Fill in all the spaces to complete the form below: You can use whatever coins you want as long as the total comes out to \$86.68.

Use today's date, your name, and the time.



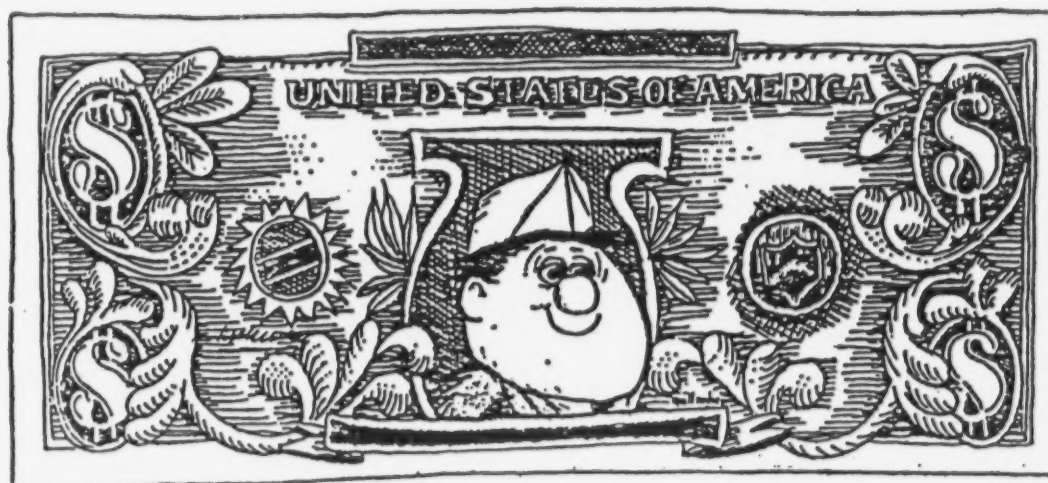
DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)		2	0 0
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	



And away we go!

- I. **JOB TITLE:** Handling Money
- II. **JOB DESCRIPTION:** Making out Daily Cash Check-In Slips
- III. **INFORMATION NEEDED:** Complete Job S-4B and be familiar with cash check-in slips. Be able to add, subtract, multiply and divide denomination of money.
- IV. **MATERIALS NEEDED:** Work sheets S-4C I and S-4C II and sample check-in slip.
- V. **TASK:** Look at the sample and see where each figure should go. Fill in work sheets S-4C I and S-4C II.
- VI. **QUALITY CONTROL:** Have supervisor check your work.
- VII. **PAY:** \$3.60
- VIII. **MATERIALS UTILIZED FOR LEARNING EXPERIENCE:**
 - A) Math Principles For Food Service Occupations - Haines 114 - 122
 - 1) Cashier's Daily Worksheet
 - 2) Tipping
 - B) Cash Register - Obtained from D.E. Shop
 - C) Stein's Refresher Mathematics - pg. 553 - Making Change
 - D) Worksheets S-4C, S-4C I, & S-4C II

HANDLING CASH



A day does not pass for any of us without using money. Because of this it is very important to learn the skill of handling money. When we buy, sell, or enter into any business transaction concerning money, we should be prepared to use this important skill.

In the store you will be giving out change to customers. Many times you will have several people waiting for you. It is important that you can give change rapidly and accurately, so that at the end of the day your cash will balance.

SAMPLE: FOR MAKING OUT DAILY CASH CHECK-IN SLIP



DATE

VALUE
OF
EACH

NAME OF EACH DENOMINATION

YOUR
NAME

DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)			
Halves			
Quarters			
Dimes			
Nickels			
Pennies			
NAME _____			
TIME _____		TOTAL CASH	

TOTAL
CASH

THE TIME YOU
CHECKED THE
CASH

THE COUNT OF
EACH
DENOMINATION

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4C 1

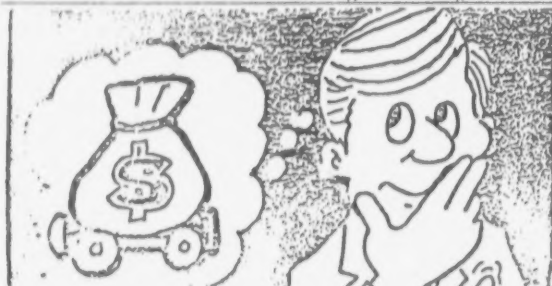
NAME _____ CLUSTER _____ DATE _____

SAMPLE: FOR MAKING OUT DAILY CASH CHECK-IN SLIP

Here is an example of a check-in cash slip made out by Zip Zipper for the Dee-Lish-Us Bakery.

Zip got up on the wrong side of the bed, barely made it to the store on time, and left several important figures out when he made up the slip. Help him out by completing the slip for him. Make sure that the cash column adds up correctly.

DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)	6	6	0 0
Halves	4		
Quarters		8	0 0
Dimes	2 1		
Nickels	3 0		
Pennies	4 0		4 0
NAME Zip Zipper			
TIME 8:55 A.M.		TOTAL CASH	2 0 0 0



SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4C II

NAME _____ CLUSTER _____ DATE _____

SAMPLE: FOR MAKING OUT DAILY CASH CHECK-IN SLIP

It seems the De-Lish-Us Bakery has more than one careless employee.

When Mary Lamb counted up the cash at 6:00 P.M., she left plenty of wide open spaces, too. Fix up her slip for her and total it up.

DAILY CASH CHECK-IN SLIP FOR REGISTER			
Date	No.	Cash	
All Bills (ones)		3 4 9	0 0
Halves	7	3	5 0
Quarters	6 5		
Dimes	5 1		
Nickels	1 6		
Pennies			4 0
NAME <u>Mary Lamb</u>			
TIME <u>6:00 P.M.</u>		TOTAL CASH	



- I. JOB TITLE: Daily Sales Slips
- II. JOB DESCRIPTION: Adding up sales slips and finding percent of commission.
- III. INFORMATION NEEDED: Be able to add and subtract money totals and find percent of commission on total sales.

To find the percent of a number, change the percent to a decimal by moving the decimal two places to the left. Mutiply by the decimal. Be careful to place the decimal point correctly in the answer.

Example: Find 20% of \$36.00

20% = .20 (if there is no visible decimal point it is to the right of the number)

$$\begin{array}{r} 36.00 \\ \times .20 \\ \hline 7.2000 \end{array} = \$7.20$$

- IV. MATERIALS NEEDED: Sales slips for Jane Love and Sam Smith for 4/16/78 and 4/17/78; Work sheet S-4E; pencil
- V. TASK: Fill out work sheet S-4E using the sales slips included in attached envelope. *See below.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:

- A) Math Principles For Food Service Occupations - Haines - pg. 123-160

1. Management - operational procedures
 - a) Figuring Standard Recipe Cost
 - b) Pricing the Menu
 - c) Daily Food Cost Report
 - d) Perpetual & Physical Inventory
 - e) Financial Statements
 - f) Break-Even Analysis

- B) Steins Refresher Mathematics - pg. 240

2. Finding a percent of a number - 232
 - a) Sales Tax
 - b) Discount
 - c) Commission
 - d) Profit & Loss
 - e) Interest

- C) Worksheet S4-E

* Instructor will make up sample sales slips.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-4 E

NAME _____ CLUSTER _____ DATE _____

STUDENTS ANSWER SHEET

	Answers
1. Total of Jane's sales slips for Monday	_____
2. Total of Jane's sales slips for Tuesday	_____
3. Total of Sam's sales slips for Monday	_____
4. Total of Sam's sales slips for Tuesday	_____
5. Janes's total for Monday and Tuesday	_____
6. Sam's total for Monday and Tuesday	_____
7. 40% commision pay for Jane	_____
8. 40% commission pay for Sam	_____
9. Which girl/boy made the most pay	_____
10. By how much more money did Sam or Jane make	_____

- I. JOB TITLE: Cost of Labor, Materials, and Overhead
- II. JOB DESCRIPTION: Computing the total cost for jobs that involve materials, labor and overhead.
- III. INFORMATION NEEDED: Be able to add money figures.
- IV. MATERIALS NEEDED: Work sheet S-5; pencil
- V. TASK: Complete the problems on work sheet S-5

Sample:

What is the total cost of preparing 10 dozen chocolate chip cookies using the following ingredients and having the following labor and overhead costs:

6 eggs	.36
12 cups flour.....	.60
3 lbs. chocolate chips..	3.00
3 cups shortening	.18
5 cups sugar	.70
4 cups milk	.32
Baker's labor	10.80
Overhead	<u>3.30</u>
Total	19.26

Overhead costs include rent, repairs and utilities

- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.

VII. PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCE

- A) Math Principles for Food Service Occupations
Haines pg. 123-164

- 1) Figuring Standard Recipe Cost
- 2) Pricing the Menu
- 3) Daily Food Cost Report
- 4) Perpetual & Physical Inventory
- 5) Financial Statements
- 6) Break-even analysis

- B) Worksheet S-5

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-5

NAME	CLUSTER	DATE
------	---------	------

1. Compute the cost of one permanent wave using the following items;

- (a) Permanent wave lotion \$1.25
- (b) 3 towels at 12¢
- (c) Shampoo 2¢
- (d) end papers 3¢
- (e) Beauticians time \$5.40

2. Find the total cost of the installation of a garage door using the following information:

- (a) Garage door (cost) \$268.42
- (b) 68 Ft. 2" x 4" lumber \$29.64
- (c) 78 Ft. $\frac{1}{2}$ round moulding \$12.14
- (d) assorted nuts, bolts & screws \$14.30
- (e) carpenters labor \$162.50
- (f) overhead \$7.40

3. How much would it cost to make one dress using the following information:

- (a) cost of fabric \$12.61
- (b) buttons \$2.40
- (c) pattern \$3.02
- (d) thread \$.96
- (e) Seamstress' labor \$12.50
- (f) overhead \$2.10

4. Find the total cost of installation of a trailer hitch on a pick-up truck using the following information:

- (a) trailer hitch \$63.10
- (b) 14' $\frac{3}{4}$ " angle iron \$15.60
- (c) 8' 3" channel \$8.46
- (d) 6' 2" flat bar \$6.48
- (e) 6 lbs. E 7018 welding rod \$9.16
- (f) Welders labor \$65.00
- (g) overhead \$6.46

5. Compute the total cost of a tune-up on an automobile with the following information:

- (a) 8 45xL5 spark plugs \$10.00
- (b) 1 set D104P points \$5.25
- (c) 1 183 C Condensor \$2.65
- (d) 1 304 D rotor \$2.88
- (e) 1 536 D distributor cap \$6.40
- (f) 1 85P PCV valve \$2.65
- (g) 1 set of wires \$18.65
- (h) Mechanics labor \$27.50
- (i) overhead \$4.12

- I. JOB TITLE: Time Equivalents
- II. JOB DESCRIPTION: Converting from one time Value to Another
- III. INFORMATION NEEDED: Become familiar with the equivalent values on the Table of Time Measurements
- IV. MATERIALS NEEDED: Table of Time Measurements; Work sheet S-6A; pencil
- V. TASK: Fill in the blanks on Work sheet S-6A
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCE
 - A) Stein's Refresher Mathematics
 - 1) Measure of Time - 405
 - a) 24 hours clock - 412
 - b) Review - 414
 - B) Worksheet S-6A

TABLE OF TIME MEASUREMENT

60 seconds	(sec.)	=	1 minute	(min.)
60 minutes	(min.)	=	1 hour	(hr.)
24 hours	(hrs.)	=	1 day	(da.)
7 days	(ds.)	=	1 week	(wk.)
52 weeks	(wks.)	=	1 year	(yr.)
365 days	(dys.)	=	1 year	(yr.)

1/4 hr. = 15 min.

1/2 hr. = 30 min.

3/4 hr. = 45 min.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-6A

NAME _____ CLUSTER _____ DATE _____

Fill in the following blanks:

- | | | | | |
|-----|----------------------|---|-------|---------|
| 1. | 4 minutes | = | _____ | seconds |
| 2. | $3\frac{1}{2}$ hours | = | _____ | minutes |
| 3. | 90 minutes | = | _____ | seconds |
| 4. | $\frac{1}{4}$ hours | = | _____ | seconds |
| 5. | 120 seconds | = | _____ | minutes |
| 6. | 8 hours | = | _____ | minutes |
| 7. | 5 eight hr. days | = | _____ | hours |
| 8. | 1800 seconds | = | _____ | hours |
| 9. | $\frac{3}{4}$ hours | = | _____ | minutes |
| 10. | 3600 seconds | = | _____ | hours |

- I. JOB TITLE: Time Management
- II. JOB DESCRIPTION: Multiplying and dividing time values to determine total time allotments for a job.
- III. INFORMATION NEEDED: Complete job S-6A and be familiar with Table of Time Equivalents. Know how to multiply and divide fractions.
- IV. MATERIALS NEEDED: Work sheet S-6B; pencil
- V. TASK: Complete work sheet S-6B
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Stein's Refresher Mathematics - pg. 405 - 411
 - B. S-6B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-6B

NAME _____ CLUSTER _____ DATE _____

1. If a baker can prepare 6 pies in 1 hour, how many pies can he/she prepare in $7\frac{1}{2}$ hours? _____
2. A hairdresser can shampoo 1 person in 15 minutes. How many shampoo's can he/she do in 1 hour and 30 minutes? _____
3. If a seamstress can cut out a pattern in 30 minutes and sew a dress together in $1\frac{1}{2}$ hours how many dress patterns can he/she cut out and sew together in 6 hrs? _____
4. Your work day is 8 hrs. long. If you take $\frac{1}{2}$ hr. for lunch, and 2 fifteen minute coffee breaks during the day, how many hours do you actually work? _____
5. It takes a truck driver 7 days to travel from New York to St. Louis and back. How many trips can he/she make in 10 weeks? _____
6. If 2 carpenters can build 1 house in 26 weeks, how many houses can 4 carpenters build in 1 year? _____
7. A plumber can lay 40 feet of pipe in 3 hrs., how long would it take 2 plumbers to lay the same amount of pipe? _____
8. If a store-clerk can stack 24 cases of cans in 1 hr., how many cases could he/she stack in 8 hrs. if he/she took one hr. off for lunch? _____
9. One mason can build 2 fireplaces in 4 weeks. How long would it take him/her to build 6 fireplaces? _____
10. One welder can cut 6 twelve ft. sections of pipe in 2 hours, how many hours would it take 2 welders to cut 24 sections? _____

I. JOB TITLE: Earnings in Business

II. JOB DESCRIPTION: Applying percents to problems involving wages.

III. INFORMATION NEEDED:

Regular time or straight time means hours worked up to 40 hours per week. Overtime means any hours worked over 40 hours per week. To find overtime hourly rate multiply the regular rate by $1\frac{1}{2}$ (1.5). Know how many weeks, hours, and months there are in a year.

Example: The employees of the Salem County Vocational Development Corporation are paid weekly on the basis of a 40 hour week with "time and a half" for overtime. Find the total wages earned in one week by Philip Dunn who worked 44 hours and whose regular wage rate is \$2.30 an hour.

OVERTIME WAGES

$$\begin{array}{r} 44 - 40 = 4 \text{ overtime hours} \\ 2.30 - \text{regular rate} \\ \times 1.5 \\ \hline 3.45 - \text{overtime rate} \\ \times 4 \\ \hline 13.80 - \text{overtime rate} \end{array}$$

REGULAR TIME WAGES

$$\begin{array}{r} 2.30 \\ \times 40 \\ \hline \$92.00 \end{array}$$

TOTAL WAGES

$$\begin{array}{r} \$92.00 - \text{regular wages} \\ +13.80 - \text{overtime wages} \\ \hline \$105.80 - \text{total wages} \end{array}$$

IV. MATERIALS NEEDED: Work sheet S-7A; pencil

V. TASK: Complete work sheet S-7A

VI. QUALITY CONTROL: Take work to supervisor to be checked

VII. PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics - pg. 232

1. Finding a percent of a number

- a) Sales Tax
- b) Discount
- c) Commission
- d) Profit & Loss
- e) Interest

B. Worksheet S-7A

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-7A

NAME _____ CLUSTER _____ DATE _____

1. Find the overtime rate for each of the regular-time rates shown below. Time and a half is paid for overtime. Example:

		\$2.65	\$1.93
		3.97	2.89
Regular Rate	\$1.84	\$2.52	\$1.96
Overtime Rate			

2. Employees of SCVDC are paid on the basis of a 40 hour week with time and a half for overtime. Find the wages each of the following employees earned:

<u>Name</u>	<u>Hourly Rate</u>	<u>Hours Worked</u>	<u>Total Wages</u>
a. James Jones	\$2.30	44	_____
b. Linda Smith	1.90	46	_____
c. Alan Ricio	2.10	48	_____
d. Joan Hicks	2.40	45	_____
e. Fred Dunn	2.80	47	_____
f. John Flint	2.60	52	_____
g. Diane Green	2.70	50	_____
h. Sue Camp	3.20	49	_____

3. (a) Pay of \$215. a month is equivalent to how much a year? _____
- (b) Pay of \$2,282 a year is equivalent to how much a month? _____
- (c) \$58 a week is equivalent to how much a year? _____
- (d) \$2,730 a year is equivalent to how much a week? _____

- I. JOB TITLE: Computing Time
- II. JOB DESCRIPTION: Computing a total work day from various amounts of time.
- III. INFORMATION NEEDED: You should be able to add units of time.
- IV. MATERIALS NEEDED: Time cards; work sheet S-7B; pencil partner.
- V. TASK: The 8 - Hour Day Game
- 1) One student is designated Player A and the other is Player B.
 - 2) Player A removes a time card from the package and writes down on work sheet the amount of time written on the card.
 - 3) Player B removes a time card from the package and writes down on work sheet the amount of time written on the card.
 - 4) Each player tries to reach a total of 8 hours first by keeping a running total of his time. The first who (after both A and B have taken a turn) does wins that game.
 - 5) Players A and B check each other's addition. Incorrect addition means forfeiting the win to the other player.
 - 6) Play the game 3 times. The player who wins 3 games first is the champion.
- VI. QUALITY CONTROL: Tell supervisor the results of the game and have him/her check the addition.
- VII. PAY: \$3.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
- A. Stein's Refresher Mathematics - pg. 405
 1. Measure of Time
 - a) 24 hour clock
 - b) Precision & Accuracy
 2. Work Sheet S-7B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-7B

NAME _____ CLUSTER _____ DATE _____

PLAYER A

PLAYER B

Card 1.	Amount of time _____	Card 1.	Amount of time _____
Card 2.	Amount of time _____	Card 2.	Amount of time _____
Card 3.	Amount of time _____	Card 3.	Amount of time _____
Card 4.	Amount of time _____	Card 4.	Amount of time _____
Card 5.	Amount of time _____	Card 5.	Amount of time _____
Card 6.	Amount of time _____	Card 6.	Amount of time _____
Card 7.	Amount of time _____	Card 7.	Amount of time _____
Card 8.	Amount of time _____	Card 8.	Amount of time _____
Card 9.	Amount of time _____	Card 9.	Amount of time _____
Card 10.	Amount of time _____	Card 10.	Amount of time _____
Card 11.	Amount of time _____	Card 11.	Amount of time _____
Card 12.	Amount of time _____	Card 12.	Amount of time _____
Card 13.	Amount of time _____	Card 13.	Amount of time _____
Card 14.	Amount of time _____	Card 14.	Amount of time _____
Card 15.	Amount of time _____	Card 15.	Amount of time _____

- I. JOB TITLE: Profit
- II. JOB DESCRIPTION: Determining the profit on the sale of a particular article.
- III. INFORMATION NEEDED: Addition, subtraction and multiplication of money figures.

Profit or mark-up is the amount of money you make on something that is sold. Several things must be taken into consideration when figuring profit. You have to know first of all how much you pay for the article, what overhead cost is, and what to price the article at a fair profit. Care must be taken not to over-price.

Example: Acme Brush Co. buys brushes from the manufacturer's for \$1.73 each. The company figures that their overhead costs come to \$.88 for each brush sold if they sell 5000 brushes per month. Comparable brushes from other companies cost \$3.71 and make a profit of \$1.10 on each brush sold. Therefore if 5000 brushes were sold for 1 month the profit would be \$5500.00.

\$1.73 - cost of brush	\$1.10 - profit each brush
.88 - overhead	x5000 - number sold
<u>1.10</u> - profit	\$5500.- Profit (total)
\$3.71 - Cost to consumer	

- V. TASK: Complete work sheet S-7C
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$3.60

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

- A. Stein's Refresher Mathematics
- 1) Addition of whole numbers - 24
 - 2) Multiplication of whole numbers - 43
 - 3) Subtraction of whole numbers - 35
- B. S.R.A. Kit
- 1) Addition of whole numbers
 - 2) Multiplication of whole numbers
 - 3) Subtraction of whole numbers
- C. Worksheet S-7C

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-7C

NAME _____ CLUSTER _____ DATE _____

1. If you could buy suitcases for \$18.75 and could sell them for \$41.50 and your overhead cost was \$9.21 per unit, what would the profit be per suitcase?

2. You made \$86.66 profit on an item that cost you \$391.97 and the total that you sold it for was \$501.88. What was the overhead cost per item? _____
3. John bought a truck load of tires for \$26.11 each. He wanted to make a profit of \$1.50 each and his overhead cost was \$.78 per tire. What was the total price that he had to sell each tire for? _____

CLUSTER SERVICES

JOB NUMBER S-7D

I. JOB TITLE: Labor Costs

II. JOB DESCRIPTION: Figuring labor costs as part of overhead costs.

III. INFORMATION NEEDED:

Example: If we pay an employee \$3.60 per hour and additional overhead (electric, water, insurance, benefits etc.) is \$6.40 per hour, our total overhead costs are \$10.00.

IV. MATERIALS NEEDED: Work sheet S-7D; pencil

V. TASK: Complete work sheet S-7D

VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.

VII. PAY: \$4.00

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics

- 1) Addition of whole numbers - 24
- 2) Multiplication of whole numbers - 43
- 3) Subtraction of whole numbers - 35

B. S.R.A. Kit

- 1) Addition of whole numbers
- 2) Multiplication of whole numbers
- 3) Subtraction of whole numbers

C. Worksheet S-7D

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-7D

NAME _____ CLUSTER _____ DATE _____

1. Our total overhead costs on an item are \$11.10 per hour. Our labor cost is \$4.98 per hour. What is the cost of the additional overhead per hour?

2. A large fabrication shop has overhead costs, other than labor, of \$6.80 per hour. If the total overhead cost is \$9.30 what is the hourly rate of pay for each worker?

3. If Jim makes \$4.60 per hour and additional overhead is \$12.60 for each item, what is the total overhead cost for each item Jim produces?

- I. JOB TITLE: Payment Schedules
- II. JOB DESCRIPTION: Deciding which plan of payment would be most beneficial.
- III. INFORMATION NEEDED: Know how to add and subtract money figures and to find the percent of the total.

Important: To find the percent of a number, move the decimal point (which is always to the right of the number if it is not visible) two places to the left and multiply. Make sure your decimal point is placed correctly in the answer.

$$\begin{array}{r}
 20\% = 20.\% = .20 \qquad 6.00 \\
 \qquad \qquad \qquad \times .20 \\
 \hline
 1.2000 = \$1.20
 \end{array}$$

$$\begin{array}{r}
 7.5\% = 07.5\% = .075 \qquad 6.00 \\
 \qquad \qquad \qquad \times .075 \\
 \hline
 .45000 = \$.45
 \end{array}$$

- IV. MATERIALS NEEDED: Work sheet S-7E; Calculator; pencil
- V. TASK: Complete work sheet S-7E first by doing your figuring then check your work with the calculator. Be very careful of decimal points. Round off money figures to the next highest cent if the third number beyond the decimal point is 5 or more.
- VI. QUALITY CONTROL: Show both sets of figures to the supervisor.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
 - A. Stein's Refresher Mathematics
 - B. Worksheet S-7E

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-7E

NAME _____ CLUSTER _____ DATE _____

- I. Basic Order \$56.30
 Add 5% State Sales Tax:
 Add 2.03 for shipping cost:
 Add 1.80 for insurance coverage:
 Total cost of order _____

II. PLAN 1

1. Pay in 6 months and must pay 4% interest charge
 on total.
 What would your monthly payments be? _____

PLAN 2

2. Pay on 3 months, must pay 3.5% interest charge
 on total.
 What would your monthly payments be? _____

PLAN 3

3. Pay on receiving shipment the total cost of
 order by check. The amount will be? _____

PLAN 4

4. Enclose payment with order and company will
 pay shipping and insurance cost.
 Enclosed payment _____
5. Which plan of payment will cost you the most?

6. Which plan of payment will cost the least?

7. What is the savings between question #1 & #4?

8. What is the savings between question #2 & #3?

9. What is the savings between question #1 & #2?

10. What is the savings between question #2 & #4?

- I. JOB TITLE: Area
- II. JOB DESCRIPTION: Finding the surface area of a piece of material or an object.

III. INFORMATION NEEDED:

Surface area of an object or a piece of material may be obtained by multiplying the length times the width. Both dimensions must be expressed in the same terms (inches, feet, yards, etc.) and are given in the answer as square inches, square feet etc.

Be able to multiply whole numbers and fractions. Know how many square inches there are in a square foot.

- IV. MATERIALS NEEDED: Work sheet S-8; sample squares A and B; pencil; ruler.

- V. TASK: Use ruler to measure squares A and B. Answer questions on work sheet S-8.

- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.

- VII. PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics

1. Practical applications - measuring area
-371

- a) Rectangle
- b) Square
- c) Parallelogram
- d) Triangle
- e) Circle

- B. Worksheet S-8

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-8

NAME _____ CLUSTER _____ DATE _____

1. How many square inches are in the square marked A?

2. What is the area of square B? _____
3. What is the area (in square inches) of a piece of material that measures 8 feet by 18 inches?

4. What is the area (in square feet) of the same piece of material? _____

I. JOB TITLE: Commissions

II. JOB DESCRIPTION: Computing rates of commissions and total sales when commissions are given. $P = B = R$

III. INFORMATION NEEDED:

- A. The percent or rate of commissions is based on sales. It may be computed by dividing the amount of the commission by the amount of sales. If John Jones receives \$270. commission on a total sale of \$9,000, the rate of commission is found:

$$\$270. - \$9000.$$

$$R = \frac{P}{B}$$

$$9000 \overline{) 270.00} \quad .03 \quad \times 100 \quad .03 = .03 = 3\%$$

To change a decimal number to a percent, move the decimal point two places to the right.

- B. Sometimes the rate and amount of commission are known and you have to figure the amount of sales. For an example, a salesman takes a job that pays 8% commission and he/she wants to know how much merchandise he/she must sell to get a commission of \$750. This can be found by dividing \$750. by 8%.

$$8\% = .08 \quad .08 \overline{) 9375.}$$

$$B = \frac{P}{R}$$

IV. MATERIALS NEEDED: Worksheet S-9; pencil

V. TASK: Complete worksheet S-9

VI. QUALITY CONTROL: Take work to supervisor to be checked.

VII. PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:

A. Math Principles For Food Service pg. 33

1. Percent
2. Achievement Review - Percent

B. Stein's Refresher Mathematics - pg. 220

1. Percent
 - a. Finding a percent of a number
 1. Sales Tax

2. Discount
3. Commission
4. Profit & Loss
5. Interest

C. CSM - Computational Skills in Mathematics

a. Filmstrips & Cassettes

1. Finding Percents: Commission
2. Finding Percent: Discount

D. Worksheet S-9

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-9

NAME _____ CLUSTER _____ DATE _____

1. On sales amounting to \$4,750 a salesperson receives \$332.50 commission. The rate of commission is ____%.
2. During December Helen Smith sold \$8500 worth of goods. Her earnings for the month were \$685, which included her guaranteed salary of \$345 per month. Her commission for the month was \$ _____. Her commission percentage was ____%.
3. Ray Sisson's total sales last month were \$9,250. He only receives commission on monthly sales in excess of \$4,000. His rate of commission is ____% if he was paid \$960.00.
4. Roberta Dell is paid on a straight 6% commission basis. If she wishes to earn \$195. commission next week she will have to sell _____ amount of goods.
5. Robert Blessing is paid a monthly salary of \$400. and a commission of 2% on all sales. His total sales for the month of February will have to be \$ _____ in order that his total income for the month may be \$650.
6. During August, Ann Furtney sold \$9,300 worth of merchandise. Her monthly earnings, including a salary of \$365. amounted to \$644. (a) Her commission for the month was \$ _____. (b) The commission rate was ____%.
7. 360 is 80% of _____
8. \$264 is 75% of _____
9. \$6 is _____% of \$7.50
10. \$400 = _____% of \$250

- I. JOB TITLE: Ratio
- II. JOB DESCRIPTION: Understanding the relationship between two numbers as it is expressed in a ratio.
- III. INFORMATION NEEDED:

R A T I O & P R O P O R T I O N

The word "ratio" is really a fancy word for the relationship between different numbers.



The ratio between the weight of a 1-pound loaf of bread and the weight of a 2-pound loaf of bread is 1 to 2. If one formula calls for 6 eggs, and another calls for 2 dozen eggs, the ratio between the number of eggs in the two formulas is 6 to 24 (two dozen). This can also be expressed as:

$$\frac{6 \text{ eggs}}{24 \text{ eggs}} = \frac{6}{24} = \frac{1}{4} \text{ or } 1 \text{ to } 4$$

We normally express a ratio in its lowest terms, so we would say it was 1 to 4.

A ratio is really a problem in division. Suppose a small bakery employs 5 bakers, and a large bakery employs 50; what is the ratio between the number of bakers in each?

$$\frac{5 \text{ bakers}}{50 \text{ bakers}} = \frac{1}{10} \text{ or } 1 \text{ to } 10$$

Actually, we could look at the problem another way and say that the ratio is:

$$\frac{50 \text{ bakers}}{5 \text{ bakers}} = \frac{10}{1} \text{ or } 10 \text{ to } 1$$

This means that, for every baker the small shop employs, the large bakery employs 10.

Suppose a bakery makes two types of rolls, dinner rolls weighing 8 ounces per dozen and hard rolls weighing 24 ounces per dozen. What is the ratio between the weights of the rolls?

IV. MATERIALS NEEDED: Worksheet S-10; pencil

V. TASK: Complete worksheet S-10

VI. QUALITY CONTROL: Take worksheet to supervisor to be checked.

VII. PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics - pg.516

1. Ratio & Proportion

a. Ratio

b. Proportion

B. SRA Kit

1. Ratio & Proportion

C. Worksheet S-10

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-10

NAME _____ CLUSTER _____ DATE _____

Test your understanding. Write the ratio of:

1. 100 lbs. of flour to 200 pounds of flour. _____
2. 200 lbs. of flour to 100 pounds of flour. _____
3. 6 loaves to 36 loaves. _____
4. 6 cakes to 36 breads. _____
5. 25 cents to a dollar. _____
6. 10 pies to 40 cakes. _____
7. 6-hour fermentation time to $4\frac{1}{2}$ -hour time. _____
8. A quart measure (32 fl. oz.) to a pint measure (16 fl. oz.). _____
9. \$1.00 to \$.75. _____
10. Profit of \$8000 to profit of \$4000. _____
11. If a bakery turns out 10 loaves of white bread to each loaf of whole wheat bread, what is the ratio between the two types? _____
12. If a recipe calls for 2 pounds of flour to each pound of sugar, what is the ratio between the flour and sugar? _____
13. A recipe calls for a ratio of 2 teaspoons of vanilla to 3 teaspoons of almond extract. What is the ratio of vanilla to almond extract? _____
What is the ratio of almond extract to vanilla? _____
14. A baker can produce 100 loaves per hour, and a new, high-speed divider can turn out 500 loaves per hour. What is the ratio between the machine's production and the man's? _____
15. What is the ratio of flour to sugar in a formula that calls for 100 pounds of each? _____

- I. JOB TITLE: Converting Recipes
- II. JOB DESCRIPTION: Changing recipes from larger to smaller quantities and from smaller to larger quantities.
- III. INFORMATION NEEDED: You should be able to multiply and divide fractions and whole numbers.
- IV. MATERIALS NEEDED: Work sheet S-11; pencil.
- V. TASK: Complete work sheet S-11
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$3.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Stein's Refresher Mathematics
 - 1. Multiplication of Fractions & Mixed Numbers - pg. 118
 - 2. Division & Fractions & Mixed Numbers - pg. 127
 - 3. Multiplication of whole numbers - pg. 43
 - 4. Division of whole numbers - pg. 52
 - B. SRA Kit
 - 1. Multiplication of fractions & mixed numbers
 - 2. Division of fractions and mixed numbers
 - 3. Multiplication of whole numbers
 - 4. Division of whole numbers
 - C. Math Principles for Food Service Occupations
 - 1. Converting standard recipes - pg. 62
 - 2. Daily food production reports - pg. 67
 - D. Work sheet S-11

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-11

NAME _____ CLUSTER _____ DATE _____

- I. Here is a recipe for fresh apple pie filling, enough for two 9 inch pies. You are to work out the recipe for (a) one pie (b) 6 pies.

		For Two Pies	(a) For One Pie	(b) For Six Pies
(1)	Apples	- 3 lbs.	_____	_____
(2)	Sugar	- 3 cups	_____	_____
(3)	Lemon Juice	- 1 tbs.	_____	_____
(4)	Cinnamon	- 1½ teaspoon	_____	_____
(5)	Butter	- 2 lbs.	_____	_____
(6)	Cornstarch	- 3 tbs.	_____	_____

- II. Lets try one more. The sweet of yeast dough formula given below makes 36 soft rolls. Make a batch and a triple batch.

	Yield: 18	Yield: 36	Yield: 54
(1)	Yeast _____	2 packages _____	_____
(2)	Warm Water _____	½ cup _____	_____
(3)	Sugar _____	2/3 cup _____	_____
(4)	Salt _____	3 t. _____	_____
(5)	Shortening _____	2/3 cup _____	_____
(6)	Eggs _____	4 eggs _____	_____
(7)	Vanilla _____	2 tbs. _____	_____
(8)	Flour _____	10 cups _____	_____

- I. JOB TITLE: Time and Money
- II. JOB DESCRIPTION: Scheduling patron's appointments, totaling sales and finding commissions.
- III. INFORMATION NEEDED: See chart S-12 A and chart S-12 B for information needed for filling out work sheet S-12. See chart S-12C for sample appointment log.
- IV. MATERIAL NEEDED: Charts S-12A, S-12 B, S-12 C; work sheets S-12D, S-12E; sales slips.
- V. TASK:
 - 1) Read list of patrons for scheduling and figure the best appointment time for each.
 - 2) Place patron's names on appointment log (S-12D)
 - 3) Fill out a sales slip for each patron and total sales slips for each day on work sheet S-12E.
 - 4) Complete work sheet S-12E
- VI. QUALITY CONTROL: Take work sheet and sales slips to supervisor to be checked.
- VII. PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics

1. Computing Income - 530
 - a. Hourly wages
 - b. Weekly salaries
 - c. Monthly salaries
 - d. Annual salaries
 - e. Piece work
 - f. Commissions & Bonuses

B. Work sheet S-12

1. S-12A
2. S-12B
3. S-12C
4. S-12D
5. S-12E

CHART S-12A

Below is the time generally allowed for each service. Use this table in solving problems in this lesson.

30	minutes for a shampoo and set (S/S)	\$ 3.00
30	minutes for a manicure (man.)	\$ 1.00
1½	hrs. for a perm wave (p.w.)	\$ 8.00
15	minutes for an eyebrow arch	\$ 1.00
½	hr. for a hair cut (cut)	\$ 1.00
½	hr. for a facial	\$ 2.50
1½	hr. for a touch-up (color)	\$ 5.00
2	hrs. for bleach or frosting	\$10.00

CHART S-12B

Mrs. Hinkle	- Cut, shampoo and set - Monday - a.m.
Mrs. Moran	- Permanent wave, shampoo and set, cut - Monday - p.m.
Ms. Ostrowski	- Color, manicure, shampoo and set - Tuesday - a.m.
Mrs. Ramano	- Shampoo, set, facial - Tuesday - early p.m.
Mrs. Schultz	- Shampoo and set - Monday - early p.m.
Mr. Blehr	- Cut - Monday - a.m.
Mrs. McGhee	- Cut, shampoo - Tuesday - p.m.
Mrs. Lipka	- Frosting, shampoo and set - Tuesday early a.m.
Ms. Rankin	- Bleach - Monday - early a.m.
Mrs. Oliver	- Manicure, facial - Tuesday - late p.m.
Mrs. Goldsmith	- Shampoo, set, cut and manicure - Tuesday p.m.
Mrs. Rosenberg	- Touch-up, shampoo and set - Monday - late p.m.

CHART S-12 C
APPOINTMENTS

Day _____ Date _____ 19__

NEWARK OFFICE: PHONE MARKET2-061

102 WASHINGTON STREET

R. ODELL & SONS CO.

PARAMUS OFFICE: PHONE 487-6556

10 STATE HIGHWAY 17

TIME	MONDAY		TUESDAY		TIME
A.M.					A.M.
9:00	Ms. Rankin	Bleach	Mrs. Lipka	Frost- S/S	9:00
9:30					9:30
10:00					10:00
10:30					10:30
11:00	Mr. Blehr	Cut	Ms. Ostrowski	tint S/S	11:00
11:30	Mrs. Hinkle	Cut S/S			11:30
12:00					12:00
P.M.					P.M.
12:30	Mrs. Schultz	Shampoo-Set			12:00
1:00					1:00
1:30	Mrs. Moran	Perm-Cut S/S	Mrs. Romano	S/S Facial	1:30
2:00					2:00
2:30			Mrs. McGhee	S/S Cut	2:30
3:00					3:00
3:30			Mrs. Goldsmith	S/S cut-man.	3:30
4:00	Mrs. Rosenberg	Touch-up S/S			4:00
4:30					4:30
5:00			Miss Oliver	Facial-Man.	5:00
5:30					5:30
6:00					6:00
6:30					6:30
7:00					7:00
7:30					7:30
8:00					8:00
WANT LIST					
Breck		Odell		SUNDRY ITEMS	
Caryl Richards		Realistic		☐ BOB PINS	☐ END PAPERS
Clairol		Revlon Cosmetics		☐ CAPES	☐ HAIR NETS
Dermetics		Revlon Hair Colors		☐ COMBS	☐ KLEENEX
Eska		Zotos		☐ COTTON	☐ PEROXIDE
				☐ CURL CLIPS	☐ SPRAY NETS
				☐ Purity Cross Shampoo	

WORK SHEET # S-12D
APPOINTMENTS

Day _____ Date _____ 19__

NEWARK OFFICE: PHONE MARKET2-061
102 WASHINGTON STREET

R. ODELL & SONS CO.

PARAMUS OFFICE: PHONE 487-6556
10 STATE HIGHWAY 17

TIME				TIME
A.M.				A.M.
9:00				9:00
9:30				9:30
10:00				10:00
10:30				10:30
11:00				11:00
11:30				11:30
12:00				12:00
P.M.				P.M.
12:30				12:00
1:00				1:00
1:30				1:30
2:00				2:00
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4:00				4:00
4:30				4:30
5:00				5:00
5:30				5:30
6:00				6:00
6:30				6:30
7:00				7:00
7:30				7:30
8:00				8:00

WANT LIST

Breck	Odell	SUNDRY ITEMS	
Caryl Richards	Realistic	☐ BOB PINS	☐ END PAPERS
Clairol	Revlon Cosmetics	☐ CAPES	☐ HAIR NETS
Dermetics	Revlon Hair Colors	☐ COMBS	☐ KLEENEX
Eska	Zotos	☐ COTTON	☐ PEROXIDE
		☐ CURL CLIPS	☐ SPRAY NETS
		☐ Purity Cross Shampoo	

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-12E

NAME _____ CLUSTER _____ DATE _____

	<u>Monday - Sales Slips</u>	<u>TOTAL</u>
1.	Ms. Rankin = _____	_____
2.	Mr. Blehr = _____	_____
3.	Mrs. Hinkle = _____	_____
4.	Mrs. Schultz = _____	_____
5.	Mrs. Moran = _____	_____
6.	Mrs. Rosenberg = _____	_____

Grand Total for Monday = _____

	<u>Tuesday - Sales Slips</u>	<u>TOTAL</u>
1.	Mrs. Lipka = _____	_____
2.	Ms. Ostrowski = _____	_____
3.	Mrs. Ramano = _____	_____
4.	Mrs. McGhee = _____	_____
5.	Mrs. Goldsmith = _____	_____
6.	Miss Oliver = _____	_____

Grand Total for Tuesday = _____

(1) Total of Monday and Tuesday together = _____

(2) 50% commission _____

I. JOB TITLE: Linear Measurements

II. JOB DESCRIPTION: Learning equivalent linear measurements and learning how to convert from one value to another.

III. INFORMATION NEEDED:

Know how to interchange feet, inches and yards as shown on Table of Linear Measurement. Know how to convert from one fraction to another.

Example:

$$\frac{1}{2} \frac{(2)}{(1)} \frac{?}{4}$$

1) divide 2 into 4

2) multiply answer (2) by 1

3) place product (2) on top of fraction

$$1/2 = 2/4$$

IV. MATERIALS NEEDED: Work sheets S-13A I and S-13A II; table of linear measurement; pencil.

V. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics

1. Measure of Areas - 366
2. Measure of volume - 285
3. Capacity - Liquid measure - 391
4. Capacity - Dry measure - 396
5. Measure of weight - 400

B. Work sheet S-13A

- 1) S-13 A-I
- 2) S-13 A-II
- 3) S-13 A-III

Table of Linear Measure

12 inches (in. or ")	equals	1 foot (ft. or ")
3 feet	equals	1 yard (yd.)
36 inches	equals	1 yard
36" equals 1 yard	4½" equals	1/8 yard
9" equals ¼ yard	13½" equals	3/8 yard
18" equals ½ yard	22½" equals	5/8 yard
27" equals ¾ yard	31½" equals	7/8 yard

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-13 AI

NAME _____ CLUSTER _____ DATE _____

1. In order to save time in the adding or subtracting of fractions of a yard, the equivalent fractional form should be arrived at mentally. Practice orally the following:

- | | |
|-------------------------|--------------------------|
| a. $1/2$ yd. = $/4$ yd. | g. $1/2$ in. = $/16$ in. |
| b. $1/4$ yd. = $/8$ yd. | h. $3/4$ in. = $/16$ in. |
| c. $1/2$ yd. = $/8$ yd. | i. $1/8$ in. = $/16$ in. |
| d. $3/4$ yd. = $/8$ yd. | j. $3/8$ in. = $/16$ in. |
| e. $6/8$ yd. = $/4$ in. | k. $5/8$ in. = $/16$ in. |
| f. $4/8$ yd. = $/2$ in. | l. $7/8$ in. = $/16$ in. |

2. Give the number of inches in each of the following:

- | | |
|-------------------------|-------------------------|
| a. $1\frac{1}{2}$ yards | e. $3/4$ yard |
| b. $\frac{1}{2}$ yard | f. $3\frac{1}{2}$ yards |
| c. $7/8$ yard | g. $1\frac{3}{8}$ yards |
| d. $1/8$ yard | h. $2\frac{2}{4}$ yards |

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-13A II

NAME _____ CLUSTER _____ DATE _____

1. What part of a foot is one inch? _____
2. What is meant by a foot in terms of inches? _____
3. What part of a yard is one foot? _____
4. What is meant by a yard in terms of inches? _____
5. The number of yards in 72" equals? _____
6. The number of inches in 3 yards equals? _____
7. The number of yards in 180 inches equals? _____
8. The number of inches in 7 yards equals? _____

- I. **JOB TITLE:** Measures and Weights
- II. **JOB DESCRIPTION:** Converting units of weights and measures.
- III. **INFORMATION NEEDED:**
Study and know the information on the Chart of Measures and weights. Know how to multiply whole numbers.
- IV. **MATERIALS NEEDED:** Chart of Measures and Weights; work sheet S-13B; pencil
- V. **TASK:** Complete work sheet S-13B
- VI. **QUALITY CONTROL:** Take work sheet to supervisor to be checked.
- VII. **PAY:** \$3.60
- VIII. **MATERIALS UTILIZED FOR LEARNING EXPERIENCES**
 - A. Stein's Refresher Mathematics
 - 1. Measure of area - 366
 - 2. Measure of volume - 385
 - 3. Capacity - liquid measure - 391
 - 4. Capacity - dry measure - 396
 - 5. Measure of weight - 400
 - B. Work sheet S-13B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-13B

NAME _____ CLUSTER _____ DATE _____

CHART OF MEASURES AND WEIGHTS

Length

12 inches (in.) = 1 foot (ft.)

3 feet (ft.) = 1 yard (yd.)

Weight

16 ounces (oz.) = 1 pound (lb.)

2000 pounds (lb.) = 1 ton (T)

Liquid

2 cups - 1 pint (pt.)

2 pints (pt.) = 1 quart (qt.)

4 quarts (qt.) = 1 gallon (gal.)

Dry

2 pints (pt.) = 1 quart (qt.)

8 quarts (qt.) = 1 peck (pk.)

4 pecks (pk.) = 1 bushel (bu.)

32 quarts (qt.) = 1 bushel (bu.)

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-13B

NAME _____ CLUSTER _____ DATE _____

- | | |
|------------------------|------------------------|
| 1. 1 ft. = _____ in. | 13. 12 in. = _____ ft. |
| 2. 3 ft. = _____ yd. | 14. 4 qt. = _____ pt. |
| 3. 1 gal. = _____ pt. | 15. 1 bu. = _____ pk. |
| 4. 1 lb. = _____ oz. | 16. 5 T. = _____ lb. |
| 5. 2 ft. = _____ in. | 17. 36 in. = _____ ft. |
| 6. 3 yd. = _____ ft. | 18. 20 pt. = _____ qt. |
| 7. 1 bu. = _____ qt. | 19. 68 pt. = _____ qt. |
| 8. 7 lb. = _____ oz. | 20. 8 pk. = _____ qt. |
| 9. 4 ft. = _____ in. | 21. 1 T. = _____ lb. |
| 10. 2 pt. = _____ qt. | 22. 16 pk. = _____ bu. |
| 11. 1 gal. = _____ qt. | 23. 1 pk. = _____ qt. |
| 12. 10 qt. = _____ pt. | 24. 3 T. = _____ lb. |

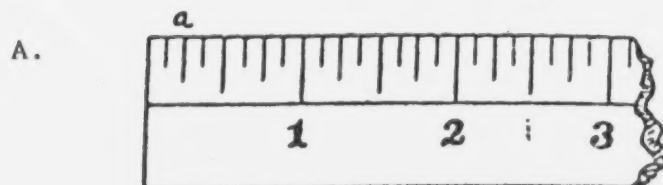
CLUSTER SERVICES

JOB NUMBER S-13C

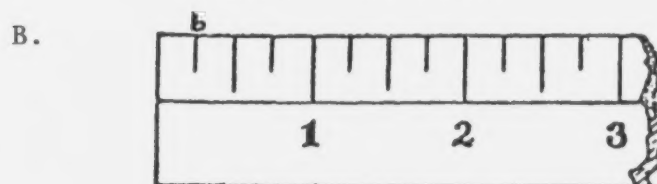
- I. JOB TITLE: Measuring
- II. JOB DESCRIPTION: Practicing accurate measurement.
- III. INFORMATION NEEDED: Learn how to read the marks on a ruler. Use the sample sheet called "The Ruler" to review what each mark means.

Practice measuring long distances.
- IV. MATERIALS NEEDED: "The Ruler" information sheet; work sheet S-13C; ruler; yard stick or tape measure; pencil.
- V. TASK: Complete work sheet S-13C
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A. Work sheet S-13C

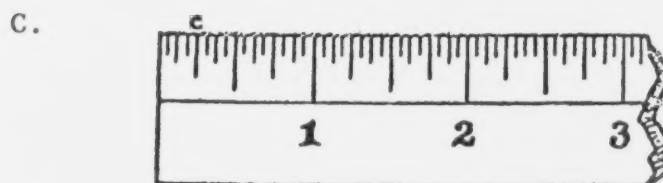
THE RULER



EIGHTHS - $\frac{1}{8}$ INCH



QUARTERS - $\frac{1}{4}$ INCH



SIXTEENTHS - $\frac{1}{16}$ INCH

1. Into how many parts is the inch in the top drawing divided? Each part is what part of an inch? Write this fraction.
2. Into how many parts is the inch in the center drawing divided? Each part is what part of an inch? Write this fraction.
3. Into how many parts is the inch in the bottom drawing divided? Each part is what part of an inch? Write this fraction.

In checking the drawings, you can see that a, b, c, are all the same measurement even though they are $\frac{2}{8}$ ", $\frac{1}{4}$ ", and $\frac{4}{16}$ ".

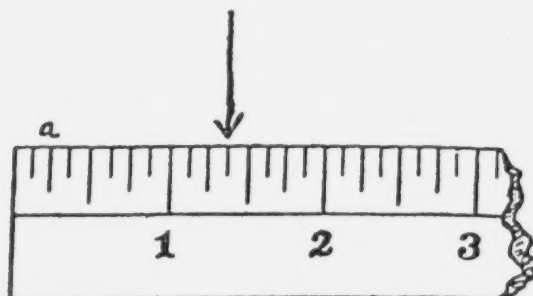
In needle trades, the ruler or tape measure ordinarily used to measure lengths is divided into inches, and each inch is divided into either 2, 4, 8, 16, or 32 equal parts, depending upon the nature of the work that is to be measured. In making a gauge, we will work with $\frac{1}{2}$ ", $\frac{1}{4}$ ", and $\frac{1}{8}$ ", since the work you will be doing seldom calls for measurement more accurate than $\frac{1}{16}$ of an inch.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

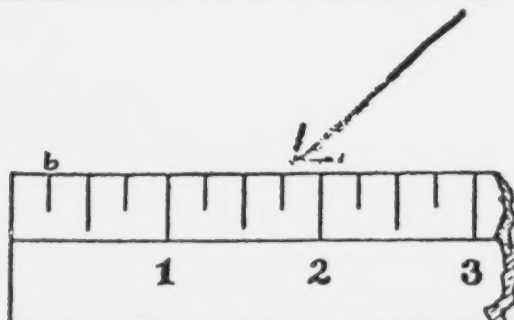
WORK SHEET # S-13C

NAME _____ CLUSTER _____ DATE _____

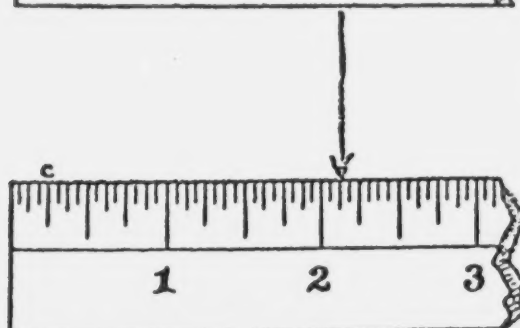
A.



B.



C.



1. The arrow on ruler A. is what measurement? _____
2. What is the measurement on ruler B.? _____
3. The arrow on ruler C. points to what measurement?

4. Measure the blackboard in this classroom. (length & width)

5. What is the length of the classroom? _____

- I. JOB TITLE: Ordering Supplies
- II. JOB DESCRIPTION: Ordering supplies from a catalog and calculating costs.
- III. INFORMATION NEEDED: Know how to use a calculator. Be familiar with how items are listed and described in a catalog.
- IV. MATERIALS NEEDED:
- 1) Henry Karper and Fils Beauty and Barber Supplies Catalog.
 - 2) Calculator
 - 3) Supply chart 14A (list of needed supplies)
 - 4) Pencil
 - 5) Work sheet S-14A
- V. TASK:
- 1) Find items on supply chart 14A in supply catalog and list them on an order blank. Be sure you describe them adequately.
 - 2) Put down the price of one and also the extend price for the number of that item you are ordering.
 - 3) Use calculator to find the grand total for all items.
- VI. QUALITY CONTROL: Show completed order blank to supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Spending money - 546
 - a) Buying at a sale - 548
 - b) Unit Pricing - 550
- B. Math Principles for Food Service Occupations
1. Management - Operational Procedures
 - a) Figuring standard recipe list - 125
 - b) Daily food cost report - 134
 - c) Break-even analysis - 161

SUPPLY CHART 14A

List of Supplies Needed

<u>Item No.</u>	<u>Description</u>	<u>Quantity</u>
1. 784/7	Cutting shear	1 doz.
2. 292	Tail brush	8 doz.
3. 1006m	Filegee Mirror	3 doz.
4. 118	Blockhead	24
5. K100	Klippies	16 boxes
6. 1929	Timer	6 1929
7. 1402	Spatulas	2 boxes
8. 225	Aluminum comb	10 dozen
9. 53	Eyelash curler	30
10. 1328	Automatic Tweezer	6

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-14A

NAME	CLUSTER	DATE
------	---------	------

Work Sheet

SHIP ORDER TO:

Name	Date
------	------

Address	Order No.
1000	1000
1001	1001
1002	1002
1003	1003
1004	1004
1005	1005
1006	1006
1007	1007
1008	1008
1009	1009
1010	1010
1011	1011
1012	1012
1013	1013
1014	1014
1015	1015
1016	1016
1017	1017
1018	1018
1019	1019
1020	1020
1021	1021
1022	1022
1023	1023
1024	1024
1025	1025
1026	1026
1027	1027
1028	1028
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1038	1038
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1075	1075
1076	1076
1077	1077
1078	1078
1079	1079
1080	1080
1081	1081
1082	1082
1083	1083
1084	1084
1085	1085
1086	1086
1087	1087
1088	1088
1089	1089
1090	1090
1091	1091
1092	1092
1093	1093
1094	1094
1095	1095
1096	1096
1097	1097
1098	1098
1099	1099

City, State, Zip Dept.

Ordered By _____ Via _____

[illegible]

Use Separate Sheet For Additional Items

- I. JOB TITLE: Quantity buying
- II. JOB DESCRIPTION: Calculating the savings when ordering by quantity.
- III. INFORMATION NEEDED: Know how to determine which quantity of an item could be bought at the lowest price.

Example: John Finn is a wholesaler. He wants to order 20,000 pencils. He talked to one manufacturer who said he would sell John pencils for 2 cents each, and another that stated that they would sell them to him for \$2.25 per 100 pencils if he bought at least 15,000.

Which is the better deal if he bought 20,000? ANSWER
Buying (a) 2¢ each.

- IV. MATERIALS NEEDED: Work sheet S-14 B; pencil.
- V. TASK: Complete work sheet S-14B.
- VI. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
 - A. Math Principles For Food Service Occupations
 - 1. Management - operational procedures - 125
 - B. Stein's Refresher Math
 - 1. Buying at a sale - 548
 - 2. Unit Pricing - Determining the better buy - 550.
 - C. Work sheet S-14B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-14B

NAME _____ CLUSTER _____ DATE _____

1. Sally Bennett wants to buy a large amount of pocket calculators. One firm will sell Sally calculators for \$27.50 each if Sally will buy at least 500. Another company will sell them to her for \$150. for every five she buys. Which is most profitable for Sally? _____
2. Ted Fehr has been buying paint for \$22.00 for each 5 gallons that he purchased. Another company wants to sell Ted paint for \$4.30 per gallon. Who should Ted buy paint from? _____
3. Quintin Merick now buys tomatoes for 39. cents per pound. Another supplier is willing to sell him tomatoes for \$41.00 per hundred pounds. Should Mr. Merrick change suppliers? _____

- I. JOB TITLE: Social Security
- II. JOB DESCRIPTION: Becoming familiar with Social Security and learning to fill out a Social Security application.
- III. INFORMATION NEEDED: Know what Social Security is and study sample application S-15C.
- IV. MATERIALS NEEDED: Information sheets S-15 A, S-15 B; Work sheet S-15C; pencil
- V. TASK: Fill out work sheet S-15C
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Work sheet S-15

- 1. S-15A
- 2. S-15B
- 3. S-15C

NAME

CLUSTER

DATE

FROM SOCIAL SECURITY NUMBER
TO
SOCIAL SECURITY BENEFITS

BEFORE YOU START WORKING
YOU GET A SOCIAL SECURITY NUMBER [REDACTED]

WHILE YOU WORK
YOUR EMPLOYERS WITHHOLD SOCIAL SECURITY CONTRIBUTIONS -
REPORT YOUR EARNINGS [REDACTED]

Self-employed people pay their own contributions
and report their own earnings

AT RETIREMENT,
IN CASE OF DISABILITY
You file a claim for benefits [REDACTED]

YOU, YOUR DEPENDENTS [REDACTED]
RECEIVE MONTHLY BENEFITS

AT 65
You become eligible for health insurance [REDACTED]

AT YOUR DEATH
Your survivors claim benefits [REDACTED]

Your survivors receive benefits [REDACTED]

SOCIAL SECURITY ADMINISTRATION

ESTABLISHES AN EARNINGS
RECORD FOR YOU

RECORDS YOUR EARNINGS

COMPUTES THE AMOUNT
OF YOUR BENEFIT;
AUTHORIZES TREASURY TO
MAKE PAYMENT

TREASURY SENDS CHECKS

ARRANGES FOR PAYMENT OF
HOSPITAL AND MEDICAL BILLS

AUTHORIZES TREASURY TO
MAKE PAYMENT

TREASURY SENDS CHECKS

U.S. Department of Health, Education, and
Welfare, Social Security Administration
1966 OAS 12

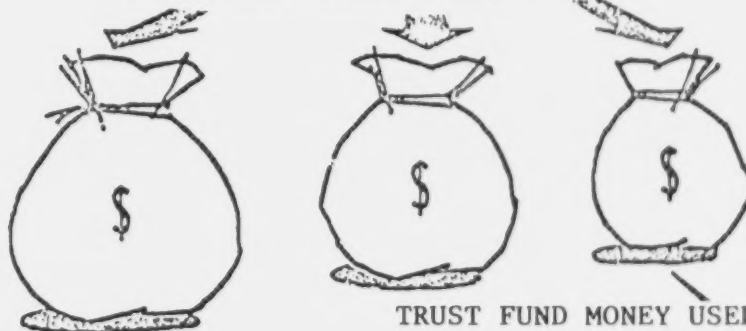
SOCIAL SECURITY

WHERE THE MONEY COMES FROM:
WHERE THE MONEY GOES.RETIREMENT, SURVIVORS, DISABILITY,
AND HOSPITAL INSURANCE

TAXES PAID DURING WORKING YEARS BY

- o EMPLOYERS
- o EMPLOYEES
- o SELF-EMPLOYED PEOPLE

3 SEPARATE TRUST FUNDS



TRUST FUND MONEY USED FOR BENEFITS



RETIREMENT



SURVIVORS



DISABILITY



HOSPITAL

VOLUNTARY
MEDICAL INSURANCEPREMIUMS BY PEOPLE 65 OR OVER
WHO SIGN UP -
EQUAL CONTRIBUTION
BY GOVERNMENT

A SEPARATE TRUST FUND



MEDICAL

Administrative costs for each program come out of the
trust fund.U.S. Department of Health, Education, &
Welfare, Social Security Administration
1963 OAS-11

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-15 C

NAME _____ CLUSTER _____ DATE _____

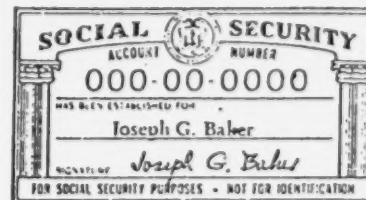
The form below is probably the most important form you will ever fill out. It is your social security application.

ID	CN	DO
APPLICATION FOR A SOCIAL SECURITY NUMBER		
See Instructions on Back. Print in Black or Dark Blue Ink or Use Typewriter.		
(First Name) (Middle Name or Initial - if none, draw line) (Last Name)		
1	Your FULL NAME YOU WILL USE IN WORK OR BUSINESS	
2	Your FULL NAME GIVEN YOU AT BIRTH	
3	PLACE OF BIRTH (City) (County if known) (State)	
4	MOTHER'S FULL NAME AT HER BIRTH (Her maiden name)	
5	FATHER'S FULL NAME (Regardless of whether living or dead)	
6	YOUR SEX MALE FEMALE	
7	YOUR COLOR OR RACE WHITE NEGRO OTHER	
8	YOUR DATE OF BIRTH (Month) (Day) (Year)	
9	YOUR PRESENT AGE (Age on last birthday)	
10	HAVE YOU EVER BEFORE APPLIED FOR OR HAD A UNITED STATES SOCIAL SECURITY, RAILROAD, OR TAX ACCOUNT NUMBER? NO YES	
11	YOUR MAILING ADDRESS (Number and Street, Apt. No., P.O. Box, or Rural Route) (City) (State) (Zip Code)	
12	TODAY'S DATE	
13	TELEPHONE NUMBER	
NOTICE: Whoever, with intent to falsify his or someone else's true identity, willfully furnishes or causes to be furnished false information in applying for a social security number, is subject to a fine of not more than \$1,000 or imprisonment for up to 1 year, or both. Sign YOUR NAME HERE (Do Not Print)		
☐ RETURN ☐ ASSIGN ☐ SUP. ISSUED		
Submit completed application to nearest SOCIAL SECURITY ADMINISTRATION OFFICE		

Every person in the United States who works must have a SOCIAL SECURITY number. This is a permanent number - you keep it throughout your entire life.



Without this I would have been a goner!



All moneys paid for social security by you and your employers are recorded under your name and number.

CLUSTER SERVICES

JOB NUMBER S-16

- I. JOB TITLE: Baker's Scale
- II. JOB DESCRIPTION: Learning to read and use the Baker's Scale.
- III. INFORMATION NEEDED: Study information sheet S-16 and know how to find values on the Baker's Scale.
- IV. MATERIALS NEEDED: Information sheet S-16; work sheets S-16A, S-16B; pencil.
- V. TASK: Complete work sheets S-16A and S-16B
- VI. QUALITY CONTROL: Take work sheets to supervisor to be checked.
- VII. PAY: \$3.60

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

- A. Math Principles For Food Service Occupations
 - 1. Preparation crew - Operational Procedures
 - a. Weights & measures - 39
 - b. Portion Control - 48
 - 2. The metric system - 175
- B. Work sheet S-16, S-16A, S-16B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

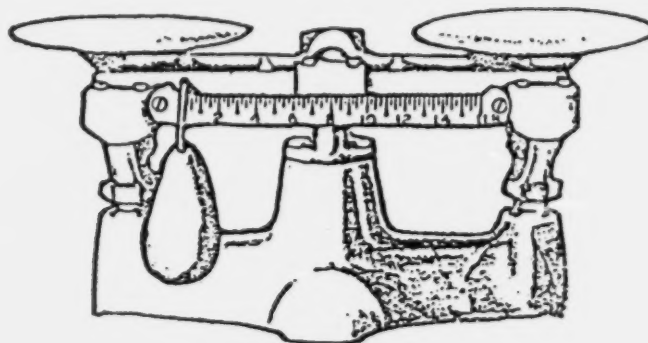
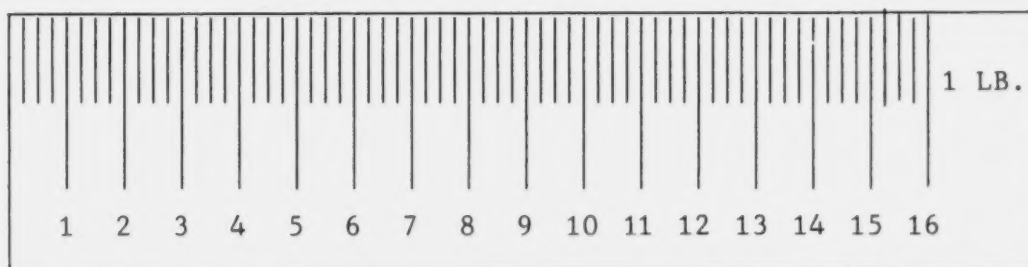
WORK SHEET # S-16

NAME _____ CLUSTER _____ DATE _____

STUDY THIS PAGE

A BAKER MUST KNOW HOW TO USE THE BAKER'S SCALE

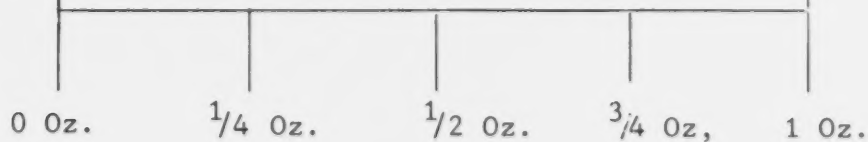
16-Oz. BAKER'S SCALE BAR



BAKER'S SCALE

There are lines between each ounce.

Each ounce is broken into quarters -
each line stands for $\frac{1}{4}$ ounce.

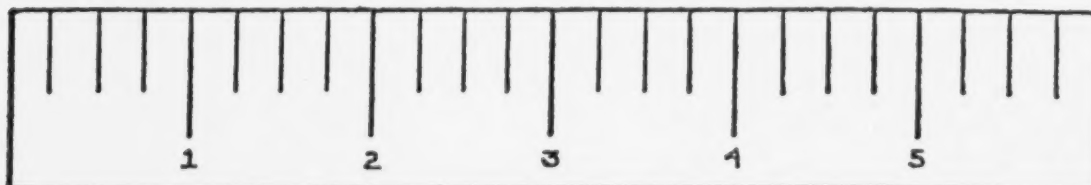


SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

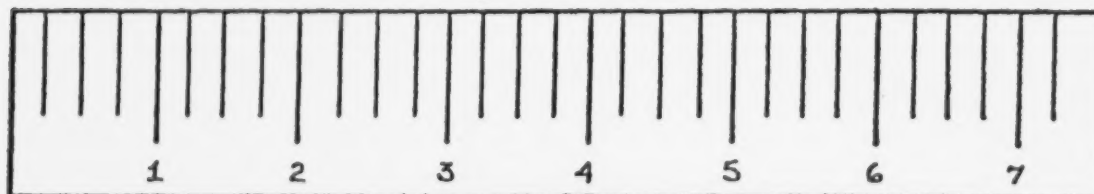
WORK SHEET # S-16A

NAME _____ CLUSTER _____ DATE _____

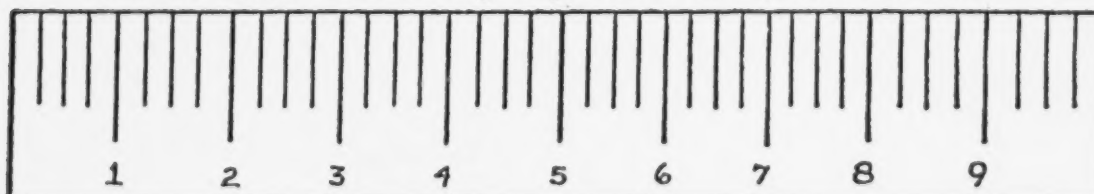
1. Draw an arrow indicating one and three-quarter ounces.



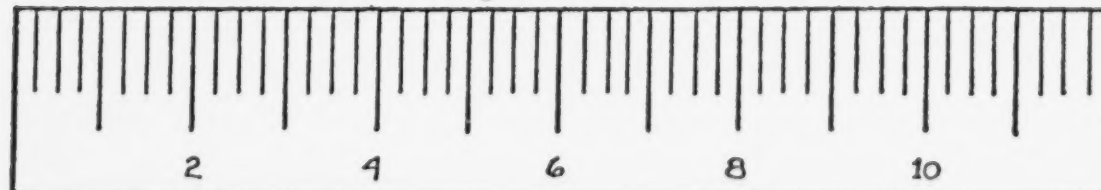
2. Draw an arrow indicating three and one-quarter ounces.



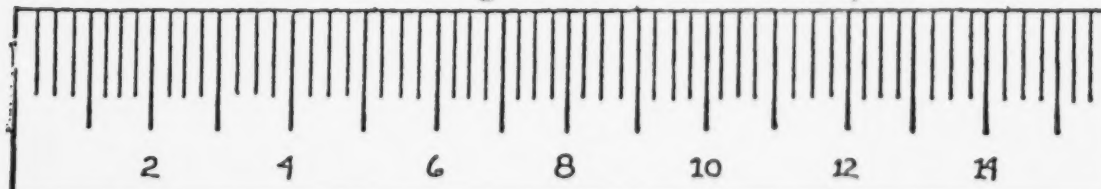
3. Draw an arrow indicating eight and one-quarter ounces.



4. Draw an arrow indicating nine and one-half ounces.



5. Draw an arrow indicating fourteen and three-quarter ounces.

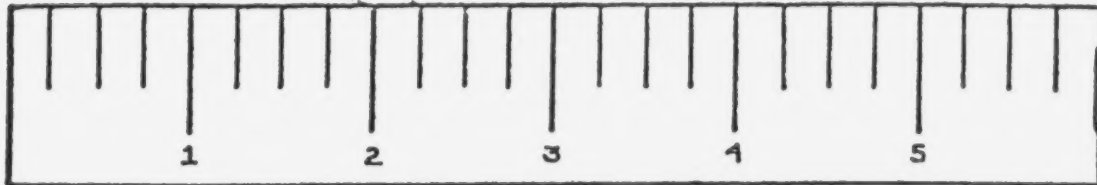


SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

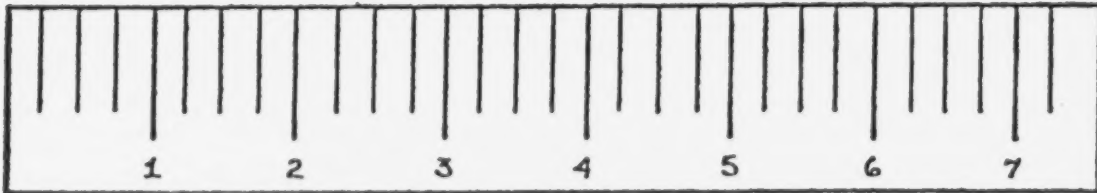
WORK SHEET # S-16B

NAME _____ CLUSTER _____ DATE _____

6. Draw an arrow indicating a quarter ounce.



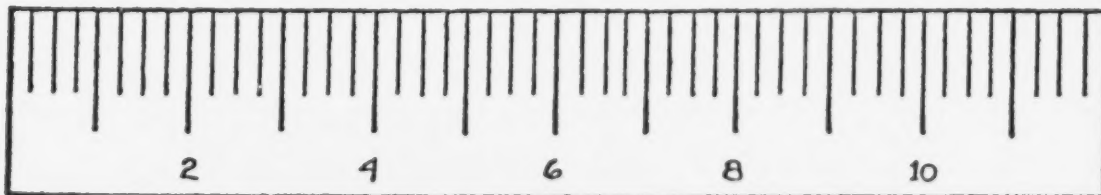
7. Draw an arrow indicating one and one-half ounce.



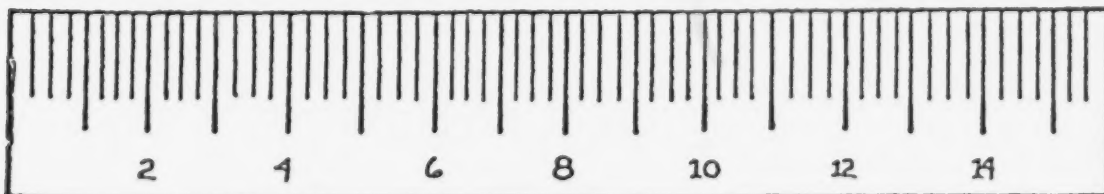
8. Draw an arrow indicating three and one-half ounces.



9. Draw an arrow indicating six and three-quarter ounces.



10. Draw an arrow indicating three-quarters of a pound.



- I. JOB TITLE: Comparative Shopping
- II. JOB DESCRIPTION: Comparing prices to insure the best buy.
- III. INFORMATION NEEDED: To find the cost per unit, divide total amount by number of units:

Example: A nine ounce tube of toothpaste cost \$1.35. The same toothpaste in a seven ounce tube cost \$.97. Which is the best buy?

\$1.35 9 = \$.15 per ounce

\$.97 7 = \$.13 per ounce - THE BEST BUY

IV. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics

1. Buying at a sale - pg.548
2. Unit Pricing - Determining the better buyer - pg. 550

B. Work Sheet S-17

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # S-17

NAME _____ CLUSTER _____ DATE _____

1. A two pound box of cereal cost \$1.29 but a box of another type cost \$1.29 for 32 ounces.

Which one should you buy? _____

2. Bread is on sale for 3 loaves for \$.99. The bread that you usually buy costs \$.34 a loaf.

Which would you buy? _____

3. You can buy a 64 ounce bottle of cleaning liquid for \$3.29. Another brand is on sale for three 28 ounce bottles for \$4.25.

Which should you buy? _____

- I. JOB TITLE: The Steel Rule
- II. JOB DESCRIPTION: Understanding the Divisions on the Steel Rule.
- III. INFORMATION NEEDED: See MEASURING INSTRUMENTS (T-1A).
- IV. MATERIALS NEEDED: Worksheet T-1B, Steel Rule, Pencil, lesson T-1A.
- V. TASK: Read lesson T-1A carefully. Answer questions 1 to 20 on worksheet T-1B.
- VI. QUALITY CONTROL: Have supervisor check your worksheet.
- VII. PAY: \$3.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A) Filmstrip - How To Use A Metric Rule
 - B) Teaching The Ruler - Teaching materials in file.
 - C) Stein's Refresher Mathematics
 - 1. Measure of length - basic units - 286
 - 2. Common Fractions
 - a. Expressing fractions in lowest term pg.89
 - b. Changing improper fractions
 - c. Changing mixed numbers to simplest form.
 - D) Worksheet T-1A & T-1B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-1A

NAME _____ CLUSTER _____ DATE _____

MEASURING INSTRUMENTS

The Steel Rule

Lesson 1

OBJECTIVE: To learn the technique of using the steel rule.

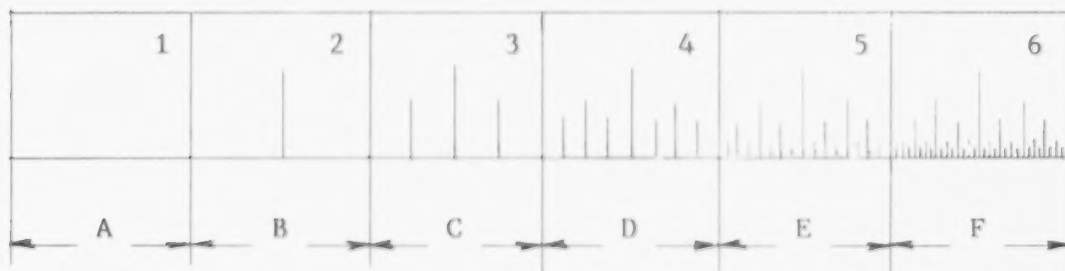
RELATED INFORMATION:

The standard steel rule, often called a scale, is a flat straight-edge of hardened metal ordinarily graduated into common fractions of an inch.

The steel rule is used to measure distances on machine shop work by sighting along a graduated scale with the naked eye. The fineness of the measurement is determined by the fineness of the graduations, since some scales on the steel rule are in eighths, sixteenths, thirty-seconds, sixty-fourths, etc. Because of the limits of its graduations and also because of the possibility of error in sighting along the scale, the steel rule is not used where extreme accuracy in measuring small dimensions is important.

The distances measured by the steel rule are always linear (i.e., length, width, and depth). Because these distances are important and because they often exist in places difficult to reach, many forms or variations of the steel rule have been developed, such as the hook rule, depth gauge, flexible rule, narrow rule, and combination square.

#1



ASSIGNMENT:

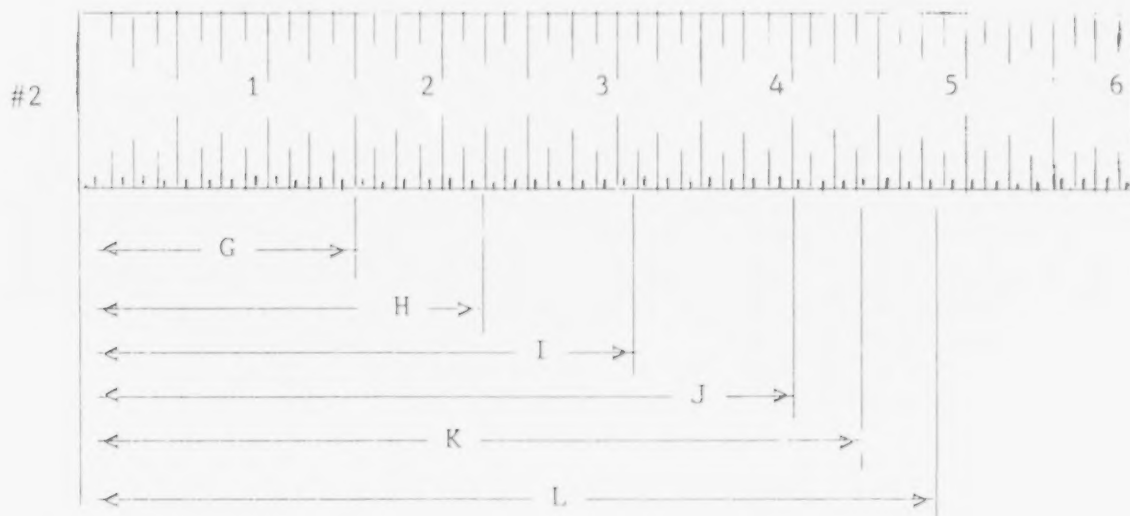
Sketch #1 shows six separate inches, five of which are divided into different parts of an inch. (A represents a whole inch; B represents a whole inch divided into 2 parts, each called $\frac{1}{2}$ inch, etc.) Tell how many parts each inch from C to F is divided into and what each part is called.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-1B

NAME _____ CLUSTER _____ DATE _____

Sketch #2 shows a 6-inch machinist's scale, the divisions of which usually are eighths on one edge and sixteenths on the other. Turning it over, you will find thirty-seconds on one edge and sixty-fourths on the remaining edge.



PROBLEMS:

1. How many inches in a foot?
2. How many inches in a yard?
3. What is the difference between a two-foot rule and a machinist's scale?
4. What is a fraction?
5. Give the dimensions indicated in Sketch #2 by the letters G, H, I, J, K, and L.
6. How many sixteenths in $\frac{21}{4}$?
7. How many sixteenths in $\frac{3}{4}$ of an inch?
8. Which is greater $\frac{13}{16}$ or $\frac{7}{8}$?
9. How many thirty-seconds in $\frac{1}{4}$ inch?
10. If $\frac{64}{64}$ equals one inch, how many sixty-fourths in $\frac{3}{4}$?
11. How many sixteenths in length G?

12. How many eighths in length H?
13. How many quarters in length H?
14. How many sixteenths in length I?
15. How many sixteenths in length J?
16. How many sixteenths in length K?
17. How many sixteenths in length L?
18. How many thirty-seconds in $\frac{3}{8}$ of an inch?
19. How many eighths in a rod $7\frac{7}{8}$ inches long?
20. Which is larger, $2\frac{9}{16}$ or $\frac{82}{32}$?

- I. JOB TITLE: Measuring Engine Parts
- II. JOB DESCRIPTION: Measuring the piston and the valve using the steel rule.
- III. INFORMATION NEEDED: Review lesson T-1A.
- IV. MATERIALS NEEDED: Steel rule, engine valve, piston, pencil, work sheet T-2.
- V. TASK: Take measurements from the piston and valve using the diagrams on work sheet T-2. Complete work sheet T-2.
- VI. QUALITY CONTROL: Have supervisor check measurements.
- VII. PAY: \$2.40.
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
 - A) Teaching The Ruler - Teaching materials in file.
 - B) Stein's Refresher Mathematics
 - 1. Measure of length - Basic units - 296
 - 2. Common fractions
 - a. Expressing fractions in lowest terms.
 - b. Changing improper fractions.
 - c. Changing mixed numbers to simplest form.
 - C) Work sheet T-2

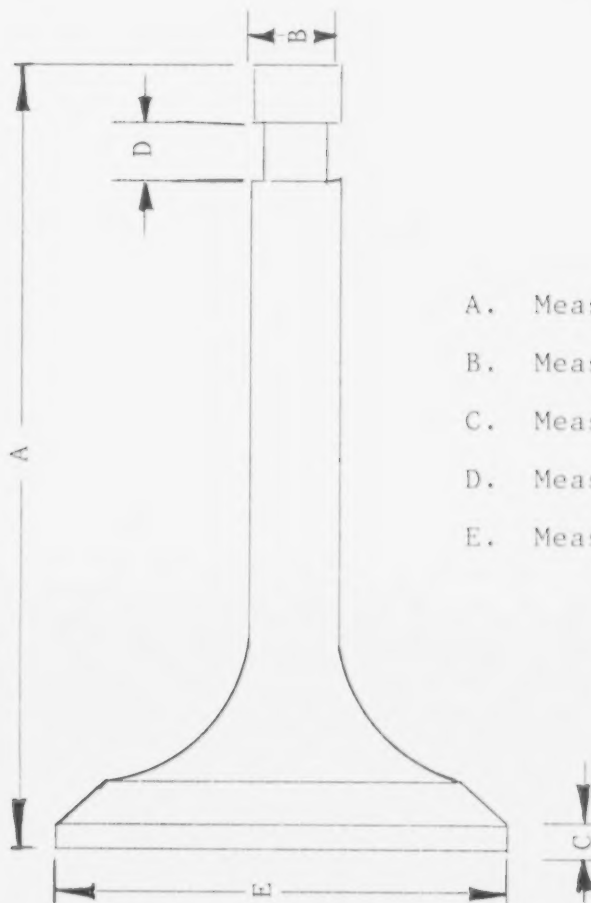
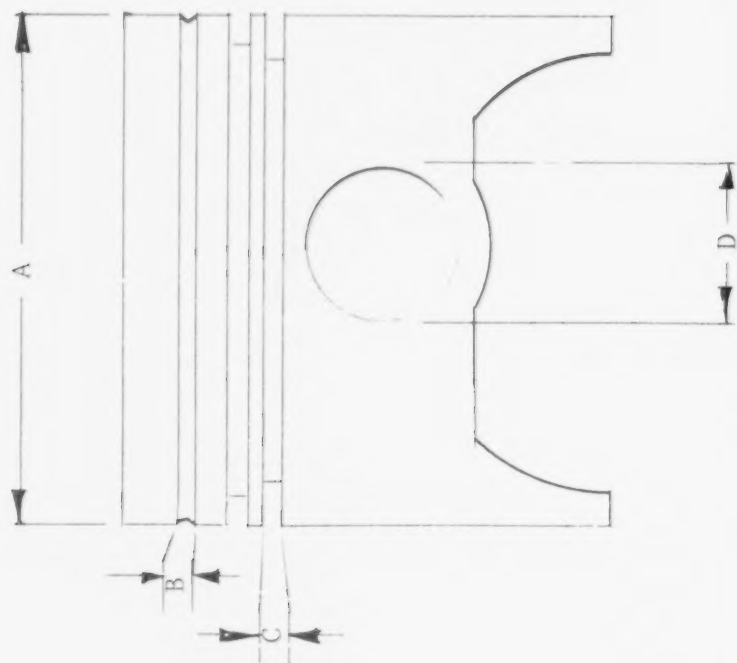
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-2

NAME _____ CLUSTER _____ DATE _____

PISTON

- A. Distance across crown _____
- B. Width of top ring _____
- C. Width of oil ring _____
- D. Diameter of pin _____



VALVE

- A. Measure total length _____
- B. Measure stem diameter _____
- C. Measure margin width _____
- D. Measure lock groove width _____
- E. Measure head diameter _____

- I. JOB TITLE: Bolt Clearance
- II. JOB DESCRIPTION: Determining the clearance for nut and washers using a steel rule.
- III. INFORMATION NEEDED: Converting fractions to common denominators and subtracting fractions.
- Using the steel rule - lesson T-1A.
- IV. MATERIALS NEEDED: Bolt, steel plates, steel rule, pencil, work sheet T-3, nut; washers.
- V. TASK: Complete worksheet T-3.
- VI. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A) Teaching The Ruler - Teaching materials in file.
- B) Stein's Refresher Mathematics
1. Measure of length - Basic Units 296
 2. Common fractions
 - a) Expressing fractions in lowest terms.
 - b) Changing improper fractions
 - c) Changing mixed numbers to simplest form
 3. S.R.A. Kit - Fractions
 4. Work sheet T-3

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-3

NAME _____ CLUSTER _____ DATE _____

1. Measure effective length of bolt. (Effective length is only that portion that can be used. It does not include the part that is turned with the wrench (THE HEAD)). _____
2. Measure the thickness of each steel plate. _____
3. Add thickness of plate together. _____
4. Subtract combined plate thicknesses from effective bolt length (#3 subtracted from #1). _____
5. The answer to #4 tells you how much of the bolt is left on which to install a nut and washer. Write this down as a common fraction. _____
6. If a nut is $\frac{7}{32}$ inches thick and the washer is $\frac{1}{16}$ inch thick, how much space on the bolt is needed? Write as a common fraction. _____
7. Subtract answer #6 from answer #5. This is how far the bolt should protrude after the plates, bolt, nut and washer are assembled. Write as a common fraction.

8. Ask supervisor for materials and assemble the plates. Measure the distance the bolt protrudes and check with your answer to #7. Are they the same? _____

- I. JOB TITLE: The Scale Drawing
- II. JOB DESCRIPTION:

Reading drawings and comparing with measurements you make from the drawings.
- III. INFORMATION NEEDED:

Ability to use steel rule, and understanding of Dimension Charts (See work sheet T-4A)
- IV. MATERIALS NEEDED:

Steel rule; Body Frame Dimension Charts; pencil; work-sheet T-4A, and T-4B
- V. TASK: Complete work sheet T-4B
- VI. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
 - A. Stein's Refresher Mathematics
 - 1. Bar graph - 523
 - 2. Line graph - 524
 - 3. Circle graph - 525
 - 4. Averages - 536
 - 5. Ratio - 516
 - 6. Proportion - 517
 - B. S.R.A. Kit
 - C. Work sheet T-4A, T-4B

TRU-WAY

Bottom View

Body-Frame Dimension Charts

Published by

TRU-WAY COMPANY

Lansing, Michigan 48902

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by Harry M. Depew

The TRU-WAY BODY FRAME DIMENSION CHARTS are working charts of the automobile chassis as the repairman sees it. We attempt to provide usable dimensions for all sections giving particular attention to critical areas and to those sections most commonly damaged. Tru-Way charts are the result of actually measuring and averaging any variation of the dimensions of hundreds of assembled automobiles. In addition, those dimensions used by the various manufacturers in construction and inspection are shown whenever we feel they will be of value and when it is possible to check these dimensions on the assembled automobile with available shop equipment.

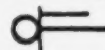
MEASURING INSTRUCTIONS found under each chart are intended to simplify and eliminate error in establishing the location of exact measuring points on the frame chart. Dimensions are given in inches. Where more than one model or body style of each make is shown on the same chart, dimensions are the same for all except as noted. Most special bodies will be found combined with closed model charts as general dimensions are the same. All measuring instructions referring to length dimensions, read from the front check point to the rear check point.

INSTRUCTIONS FOR THE USE OF THE TRU-WAY FRAME CHART

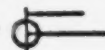
TOLERANCES — For practical purposes a $\frac{1}{4}$ inch tolerance ($\frac{1}{4}$ inch plus or minus) is recommended on most dimensions. This may be exceeded in some instances as manufacturing tolerances are more flexible in certain non critical portions of the frame. The $\frac{1}{4}$ inch tolerance is a good guide as the dimensions used on the Tru-Way charts are the average of three or more vehicles at points where any amount of variation is found.

SPECIAL TERMS USED IN MEASURING INSTRUCTIONS

We have attempted to standardize the wording of the measuring instructions, thus avoiding any confusion as the points we are referring to. Listed below are some of the terms used and their definition as applied on the Tru-Way charts.



Measure from edge of hole, rivet or bolt.



Measure from center of hole, rivet or bolt.

LENGTHS - WIDTHS - DIAGONALS — Most horizontal dimensions on the bottom view charts are direct and may be measured direct from point to point with a tape or tram between dimension points. The exceptions to this are indicated on the chart or in the measuring instructions. These will be referred to as tram dimensions. They are measured with the tram pointers extended from the tram bar so that the bar is parallel to the datum line or level plane of the body. Tram dimensions can be checked by suspending plumb bobs from frame and transferring dimension points to a floor layout for measuring.

DATUM LINE — An imaginary line from which dimensions are given in inches to establish the correct height of a given point on the automobile frame or body above this datum line. The datum gauges establish this line and provide a means of measuring any section of the frame being repaired or checked against the correct specifications for that particular automobile. These datum checks may also be made from any level work surface. The two x points are the base line and all height dimensions are established above this line.

It is essential that vehicle be supported either on its wheels, front and rear suspensions, or from the frame ends for all datum line checks. Center lifts such as a frame contact hoist, floor stands, etc., will allow reverse deflection resulting in false datum line dimensions.

REAR CONTROL ARM PIVOT BOLT — This is the bolt or pin that the rear axle torque arm bushing pivots upon and attaches the rear axle arm to the frame. Dimensions to this bolt are to the end of bolt.

REAR SPRING FRONT BOLT — The bolt, pin or stud that goes through the front eye and bushing of the rear spring and secures it to the frame or body.

FRONT SUSPENSION DIMENSION POINTS — For checking front suspension location in relation to frame, all charts show a dimension from a definitely established point at the lower suspension control arm (A-frame), to a given point on the frame proper. Unless the measuring instructions direct otherwise, this measurement is always checked with the vehicle raised enough to have control arms at the bottom of their travel, with upper control arm resting on its stop or bumper.

BALL JOINT POINTS — We use as a dimension point on various cars the ball joint stud. This dimension is measured from the center of the tip of ball stud that attaches and protrudes through spindle or knuckle support. Some charts will use the ball joint grease fitting or the center of the ball joint plug as the dimension point where it is found to be more accessible than the stud.

WE WISH TO EXPRESS OUR THANKS TO THE VARIOUS MANUFACTURERS, BOTH DOMESTIC AND FOREIGN, FOR THEIR COOPERATION AND ASSISTANCE IN PROVIDING MATERIAL FOR USE IN THE PREPARATION OF THIS MANUAL. THE MANUFACTURERS AND THEIR RESPECTIVE DIVISIONS TO WHICH WE EXPRESS OUR GRATITUDE ARE THOSE WHOSE PRODUCTS ARE INCLUDED IN THIS MANUAL.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-4B

NAME _____ CLUSTER _____ DATE _____

1. Scan all the charts provided. Study carefully the charts for 1974 Chevelle and 1975 Monte Carlo. They are shaped nearly alike but the dimensions are quite different.

2. List the following dimensions printed on the chart:

	<u>CHEVELLE</u>		<u>MONTE CARLO</u>
A-		A-	
D-		D-	
J-		J-	

3. Find the difference between the frames.

		LARGER/SMALLER	HOW MUCH?
A-	Chevelle is	_____	by _____
D-	Chevelle is	_____	by _____
J-	Chevelle is	_____	by _____

4. Repeat #2 and #3 only use steel rule instead of reading the charts.

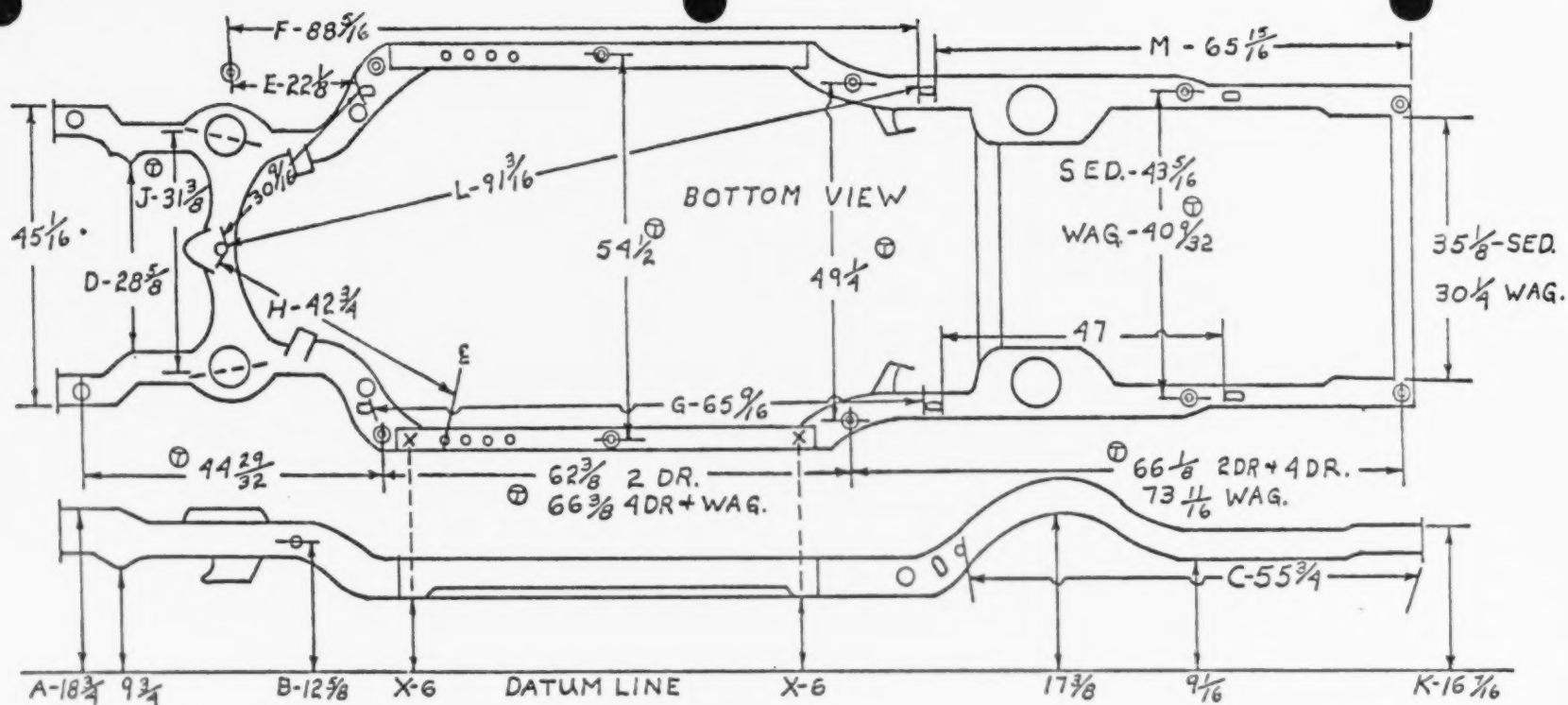
	<u>CHEVELLE</u>		<u>MONTE CARLO</u>
A-		A-	
D-		D-	
J-		J-	

		LARGER/SMALLER	HOW MUCH?
A-	Chevelle is	_____	by _____
D-	Chevelle is	_____	by _____
J-	Chevelle is	_____	by _____

5. What is the difference between the wheel base of the Monte Carlo and the Chevelle?

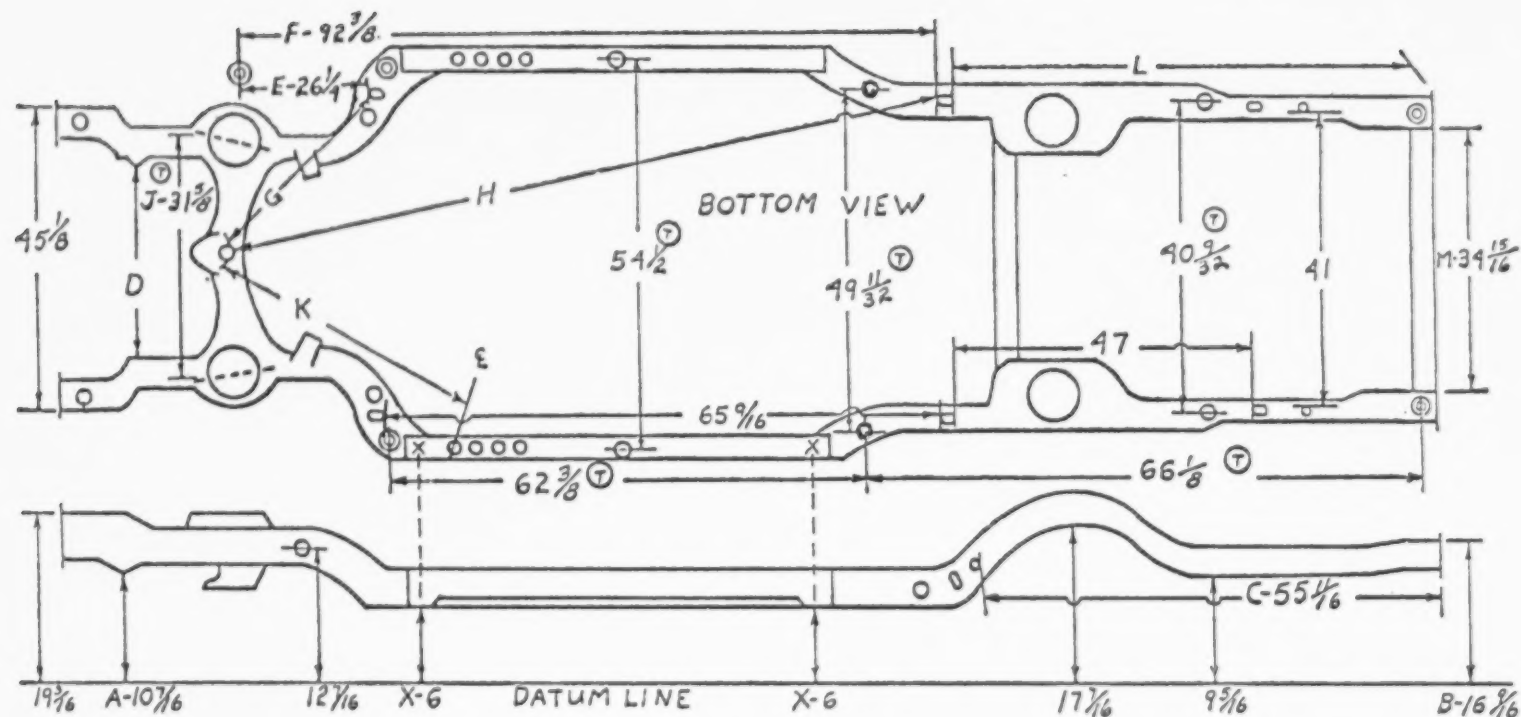
(Wheel base (W.B.) is the distance from the center of the front wheel to the center of the rear wheel on the same side of the car.)

Think. What would happen if the wheel base were set incorrectly and was shorter on one side than the other?



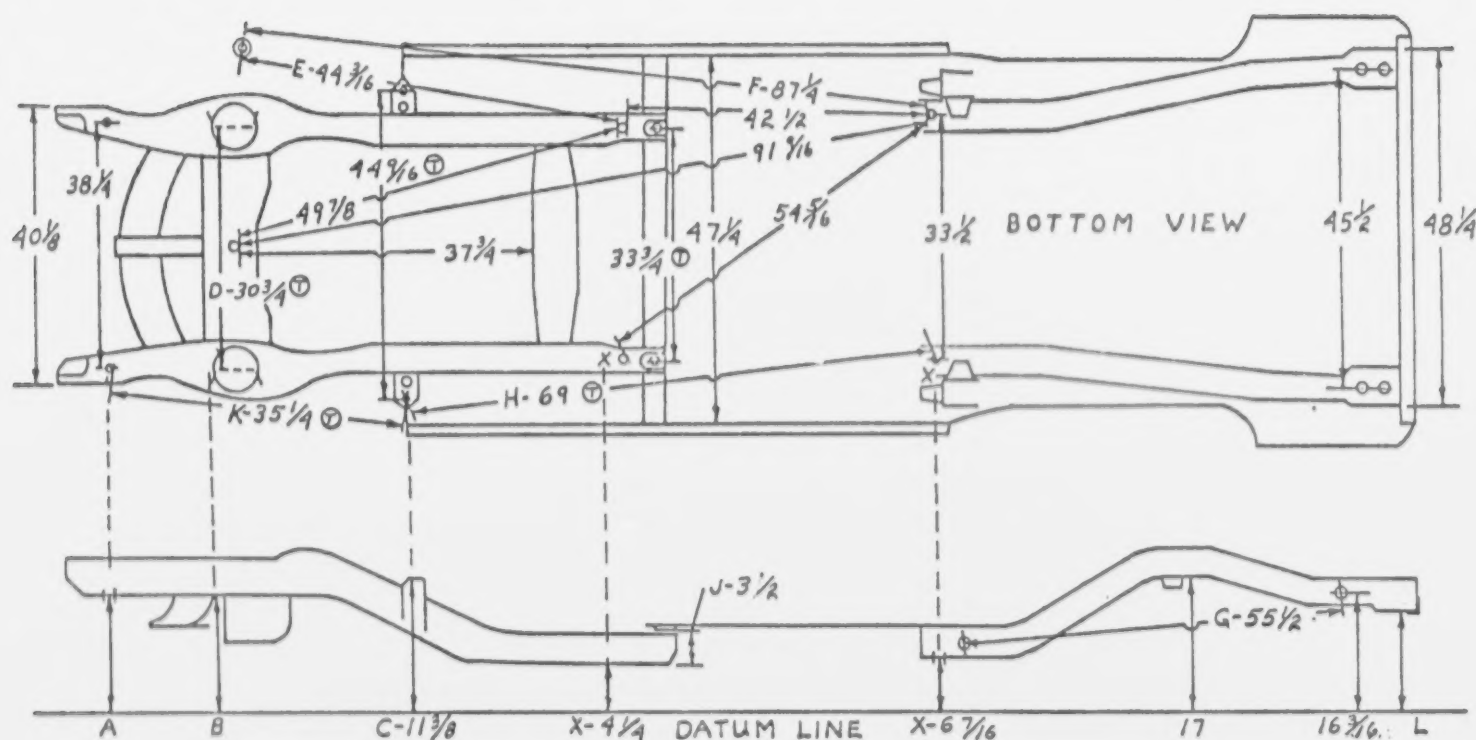
- A - 18 3/4 - From top of rail alongside radiator support bracket, to datum line.
 B - 12 5/8 - From center of flanged tie down hole to datum line.
 C - (55 3/4 - 2 DR & 4 Dr) (63 1/8 - Sta. Wag.) - Edge of tie down flanged hole to lower bottom outer flanged edge of side rail.
 D - 28 5/8 - Between side rails at lower steering gear bolt to idler arm mounting surface.
 E - 22 1/8 - Center of lower ball joint grease fitting, to edge of hole.
 F - (88 5/16 - 2 DR) (92 5/16 - 4 DR & Sta. Wag.) - Center of ball joint grease fitting, to edge of hole.
 G - (65 9/16 - 2 DR) (69 5/8 - 4 DR & Sta. Wag.) - Edge to edge of indicated holes.
 H - 42 3/4 - Edge of cross member hole to center of indicated hole.
 J - 31 3/8 - TRAM - TOP SIDE - Between upper control arm inner shaft seats at front shim contact surface.
 K - 16 7/16 - Rear top surface of frame rail (at body bolt area), to datum line.
 L - (91 3/16 - 2 DR) (94 15/16 - 4 DR & Sta. Wag.) - Edge to edge of indicated holes.
 M - (65 15/16 - 2 DR & 4 DR) (73 - Sta. Wag.) - Edge of indicated hole to lower bottom outer edge of side rail.
 X - - Locations for mounting #2 and #3 datum gauges. Adjust sighting pins to 6" below the lowermost surface of the frame side rail at the locations indicated.

T Dimensions require tramping with tram bar level or parallel to plane of body; other dimensions are direct.



- A - 10 7/16 - From lowest point on side rail at sway bar mounting area to datum line.
- B - 16 9/16 - From rear top edge of side rail to datum line.
- C - 55 11/16 - From edge of flanged tie down hole to rear lower outer bottom edge of side rail flange.
- D - 28 1/4 - Between side rails at lower steering gear mounting bolt surface to idler arm mounting surface.
- E - 26 1/4 - Center of lower ball joint grease fitting to edge of gauge hole.
- F - 92 3/8 - Center of lower ball joint grease fitting to edge of gauge hole.
- G - 33 1/2 - Edge to edge of indicated holes.
- H - 95 - Edge to edge of indicated holes.
- J - 31 5/8 - TRAM - Between upper control arm inner shaft seats at front shim contact surface.
- K - 46 1/8 - From edge of cross member hole to center of indicated side rail hole.
- L - 65 7/8 - Edge of gauge hole to lower bottom outer edge of side rail flange.
- M - 34 15/16 - Between side rails at LOWER inner surfaces.
- X - - Locations for mounting #2 and #3 datum gauges. Adjust sighting pins to 6" below lowermost surface of frame side rail at both locations.

T Dimensions require tramping with tram bar adjusted parallel to plane of frame; other dimensions are direct.



-14-

- | | |
|-------------|--|
| A - 10 | - From bottom surface of side rail alongside gaugehole, to datum line. |
| B - 10 1/8 | - From bottom surface of side rail just forward of spring pocket, to datum line. |
| C - 11 3/8 | - Bottom surface of #1 body support bracket (alongside gauge hole), to datum line. |
| D - 30 3/4 | - TRAM - TOP SIDE - Between upper control arm inner shaft seats (at shim contact area). |
| E - 44 3/16 | - Center of lower ball joint grease fitting to edge of hole. |
| F - 87 1/4 | - Center of lower ball joint grease fitting to edge of hole. |
| G - 55 1/2 | - Center of rear spring front bolt, to center of rear spring shackle top pin. |
| H - 69 | - TRAM - Center of gauge hole alongside #1 body bolt, to center of gauge hole at rear sub frame. |
| J - 3 1/2 | - From bottom surface of body floor reinforcement at bolt area, to bottom edge of side rail. |
| K - 35 1/4 | - TRAM - Rear edge of front gauge hole, to center of gauge hole alongside #1 body bolt. |
| L - 14 1/4 | - From end of side rail (lower surface) just forward of X member flange, to datum line. |
| X - | - Locations for mounting #2 and #3 datum gauges. |
| FRONT X | - Adjust sighting pin 4 1/4" below bottom outside edge of side rail. |
| REAR X | - Adjust sighting pin 6 7/16" below bottom surface of sub frame at gauge hole area. |

- I. JOB TITLE: Machinery Allowance
- II. JOB DESCRIPTION: Figuring machinery allowances using specification charts.
- III. INFORMATION NEEDED:
- To overhaul an engine you need to know if the components in the engine have been machined oversize (o.s.) or undersize (u.s.). You cannot install a piston that is standard (std) in a cylinder that has been machined oversize.
- Job sheet will enable you to know how to tell how much machinery has been done to engine parts.
- Review rules for adding and subtract decimals.
- IV. MATERIALS NEEDED: Specification sheets T-5B 1 and T-5B 2; pencil; work sheet T-5B.
- V. TASK: Complete work sheet T-5B.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$3.60.
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics - Decimal Fractions
1. Reading & writing decimals - 15
 2. Rounding decimals
 3. Addition of decimals
 - a) Micrometer Caliper Readings 164
- B. Diesel Mechanics - Schultz
1. Shop Equipment
 - a) Hand tools - 355
 - b) Shop Tools - 365
 - c) Masuring tools - 371
- C. S.R.A. Kit
- D. Work sheet T-5B, T-5B-1, T-5B-2

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

SPECIFICATION SHEET # T5 B1

HERCULES

STOCK ENGINES

HERCULES

ENGINE IDENTIFICATION—Model stamped on plate attached to engine.

GENERAL ENGINE SPECIFICATIONS

Engine Model	Type	No. Cyls. & Valve Location	Bore and Stroke	Piston Displacement Cu. In.	Compression Ratio	Horsepower @ R.P.M.	Torque Lb. Ft. @ R.P.M.	Normal Oil Pressure, Lbs.	Engine Oil Capacity Qts.
DPXE	Diesel	6 In Head	3 1/2 x 6	893	14.80	227 @ 2100	685 @ 1250	50	24
DPXH	Diesel	6 In Head	3 1/2 x 6	935	14.80	260 @ 2100	750 @ 1200	50	24
DIX4D	Diesel	4 In Head	3 1/2 x 4	166	15.50	57 @ 3000	120 @ 1500	30	0
DIX6-272	Diesel	6 In Head	3 1/4 x 4 1/2	272	15.50	103 @ 3000	202 @ 1800	30	0
DJXB	Diesel	6 In Head	3 1/2 x 4 1/2	260	15.50	77 @ 2600	178 @ 1300	45	0
DJXC	Diesel	6 In Head	3 1/2 x 4 1/2	298	15.50	83 @ 2600	208 @ 1300	45	0
DJXH	Diesel	6 In Head	3 1/2 x 4 1/2	298	15.50	99 @ 2600	224 @ 1400	45	0
DOOD	Diesel	4 In Head	4 1/4 x 4 1/2	255	15.50	79 @ 2600	183 @ 1400	30	0
DRXC	Diesel	6 In Head	4 1/4 x 5 1/4	529	15.00	147 @ 2200	400 @ 1100	30	0
DWXL0	Diesel	6 In Head	4 1/4 x 5	426	15.50	142 @ 2600	328 @ 1600	40	0
D-1500	Diesel	3 In Head	3 1/2 x 4 1/2	149	17.50	46 @ 2600	113 @ 1500	40	0
D-1700	Diesel	3 In Head	4 x 4 1/2	169	17.50	50 @ 2600	128 @ 1500	40	0
D-2000	Diesel	4 In Head	3 1/2 x 4 1/2	198	17.50	70 @ 2600	156 @ 1500	40	0
D-2130	Diesel	4 In Head	3 1/2 x 4 1/2	—	—	—	—	40	0
D-2300	Diesel	4 In Head	4 x 4 1/2	226	17.50	73 @ 2600	182 @ 1400	40	0
D-3000	Diesel	6 In Head	3 1/2 x 4 1/2	298	17.50	114 @ 3000	244 @ 1400	40	0
D-3000T	Diesel	6 In Head	3 1/2 x 4 1/2	298	17	117 @ 2000	308 @ 2000	—	0
DH-3000	Diesel	6 In Head	3 1/2 x 4 1/2	298	17.50	101 @ 2400	229 @ 1800	—	0
D-3400	Diesel	6 In Head	4 x 4 1/2	339	17.50	115 @ 2600	276 @ 1400	40	0
D-4800	Diesel	6 In Head	4 1/4 x 4 1/2	478	18	143 @ 2400	350 @ 1800	45	0
G-1400	Gasoline	4 In Head	3 1/2 x 3	141	8.0	58 @ 2800	115 @ 2000	40	0
G-1600	Gasoline	4 In Head	4 x 3 1/2	163	8.0	60 @ 2400	140 @ 1400	40	0
G-2000	Gasoline	4 In Head	3 1/2 x 4 1/2	198	7.50	78 @ 2400	185 @ 1400	35	0
G-2300	Gasoline	4 In Head	4 x 4 1/2	226	7.50	81 @ 2200	207 @ 1400	35	0
G-3000	Gasoline	6 In Head	3 1/2 x 4 1/2	298	7.50	117 @ 2400	270 @ 1300	35	0
G-3400	Gasoline	6 In Head	4 x 4 1/2	339	7.50	132 @ 2400	310 @ 1300	35	0
HXE	Gasoline	6 In Block	5 1/4 x 6	935	6.20	227 @ 2000	750 @ 900	35	0
IXB	Gasoline	4 In Block	3 1/2 x 4	133	6.50	46 @ 3200	92 @ 1800	20	0
JXC	Gasoline	6 In Block	3 1/2 x 4 1/2	282	6.50	103 @ 3200	207 @ 1400	26	0
JXD	Gasoline	6 In Block	4 x 4 1/2	320	6.50	112 @ 3200	240 @ 1400	26	0
JXLD	Gasoline	6 In Block	4 x 4 1/2	339	6.50	131 @ 3200	272 @ 1400	26	0
L-237	Gasoline	6 In Block	3 1/2 x 4 1/2	236.7	—	79 @ 2400	185 @ 1400	—	—
QXD	Gasoline	6 In Block	3 1/4 x 4 1/2	230	6.50	78 @ 3200	167 @ 1500	26	0
QXLD	Gasoline	6 In Block	3 1/4 x 4 1/2	237	6.50	92 @ 3200	190 @ 1400	26	0
RXC	Gasoline	6 In Block	4 1/4 x 5 1/4	529	6.30	143 @ 2400	372 @ 1100	26	0
RXLDH	Gasoline	6 In Block	4 1/4 x 5 1/4	558	6.50	181 @ 2600	443 @ 1400	26	0
TCD-893	Diesel	6 In Head	5 1/2 x 6	893	14.80	318 @ 2000	846 @ 1800	80	0
WXL0-3	Gasoline	6 In Block	4 1/4 x 4 1/2	404	6.50	139 @ 2600	312 @ 1300	26	0

0—Depends upon type of oil pan used.

TUNE UP & VALVE SPECIFICATIONS

Engine Model	Firing Order	Spark Plug Gap	Breaker Gap	Ignition or Injection		Cylinder Head Torque Lb. Ft.	Valve Seat Angle Degrees	Valve Clearance		Valve Spring Pressure (Minimum) Lbs. @ Inch Length	
				Timing				H-Hot	C-Cold	Outer	Inner
				Mark	Location			Intake	Exhaust		
DPXE	153624	None	None	27° BTDC	Flywheel	350	45	.010H	.016H	94 @ 3	57 @ 2 1/2
DPXH	153624	None	None	27° BTDC	Flywheel	350	45	.010H	.016H	124 @ 1 1/2	96 @ 1 1/2
DIX-4-D	153624	None	None	30° BTDC	Flywheel	158	45	0	0	49 @ 1.21	34 @ 1.09
DIX-6-272	153624	None	None	30° BTDC	Flywheel	188	45	0	0	49 @ 1.21	34 @ 1.09
DJXC	153624	None	None	26° BTDC	Flywheel	157	45	0	0	55 @ 1.40	37 @ 1.28

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-5B

NAME _____ CLUSTER _____ DATE _____

1. Examine and become familiar with specification sheets T-5B 1 and T-5B 2.
2. Find the shaft diameter (distance across) of a crankshaft (Main bearings) for a 1966 Chevrolet 8-366 engine. Notice two numbers are given. The actual diameter could be anything from the smaller number to the larger. What is the difference between the two?

3. If the crankshaft were machined (ground) .030 thousandths undersize (under the upper limit) what would the diameter be after machinery?
_____ Remember, machinery removes metal so the diameter should be smaller.
4. Find the standard cylinder bore size (first number under Bore and Stroke) for a G-1400 Hercules engine. Convert to a decimal. _____
5. If the engine needed to be bored .010 oversize what would the finished size be after boring removes metal from the inside of the cylinder so that it will be larger after machinery.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

SPECIFICATION SHEET # T5 B2

CHEVROLET

PISTON, PIN, RING, CRANKSHAFT & BEARING SPECIFICATIONS

Engine Model	Year	Piston Clearance	Ring End Gap		Piston Pin Diam.	Rod Bearings		Main Bearings			
			Comp.	Oil		Shaft Diameter	Bearing Clearance	Shaft Diameter	Bearing Clearance	Thrust Bearing No.	Shaft End Play
4-140	1971-72	.0018-.0028	.009	.010	.9271	1.999-2.000	.0007-.0027	2.2983-2.2993	.0003-.0029	4	.002-.007
4-140	1973	.0018-.0028	.009	.010	.9271	1.999-2.000	.0007-.0038	2.2983-2.2993	.0003-.0027	4	.002-.007
4-140	1974-75	.0018-.0028	⊖	.010	.9271	1.999-2.000	.0007-.0038	2.2983-2.2993	⊖	4	.004-.012
4-153	1963-65	.0005-.0011	.010	.015	.9271	1.999-2.000	.0007-.0028	2.2983-2.2993	.0008-.004	Rear	.002-.006
4-194	1964-66	.0005-.0011	.010	.015	.9271	1.999-2.000	.0007-.0028	2.2983-2.2993	.0008-.004	Rear	.002-.006
4-230	1963-67	.0005-.0011	.010	.015	.9271	1.999-2.000	.0007-.0028	2.2983-2.2993	⊖	5	.002-.006
4-230	1968-69	.0005-.0011	.010	.015	.9271	1.999-2.000	.0007-.0027	2.2983-2.2993	.0003-.0029	5	.002-.006
4-235	1960-62	.0005-.0011	.007	.015	.8662	2.311-2.312	.001-.003	⊖	.0008-.0026	3	.003-.009
4-230	1966-69	.0005-.0011	.010	.015	.9271	1.999-2.000	.0007-.0027	2.2983-2.2993	.0003-.0029	5	.002-.006
4-250	1970-76	.0005-.0015	.010	.015	.9271	1.999-2.000	.0007-.0027	2.2983-2.2993	.0003-.0029	5	.002-.006
4-261	1962	.0005-.0011	⊖	.015	.9272	2.311-2.312	.001-.003	⊖	.0008-.0026	3	.003-.009
4-292	1963-68	.0026-.0032	.010	.015	.9271	2.099-2.100	.0007-.0028	2.2983-2.2993	.0008-.0034	5	.002-.006
4-292	1969-72	.0025-.0031	.010	.015	.9271	1.999-2.100	.0007-.0028	2.2983-2.2993	.0008-.0034	5	.002-.006
4-292	1973-76	.0026-.0036	.010	.015	.9271	2.099-2.100	.0007-.0027	2.2983-2.2993	.0008-.0034	5	.002-.006
8-283	1962-67	.0005-.0011	.010	.015	.9272	1.999-2.000	.0007-.0027	2.2978-2.2988	.0007-.0028	5	.002-.006
8-307	1968-69	.0005-.0011	.010	.015	.9272	1.999-2.000	.0007-.0027	⊖	⊖	5	.003-.011
8-307	1970-73	.0005-.0011	.010	.015	.9272	2.099-2.100	.0007-.0020	⊖	⊖	5	.002-.006
8-327	1962-67	.0010-.0016	⊖	.015	.9272	1.999-2.000	.0007-.0028	2.297-2.299	⊖	5	.003-.011
8-327	1968-69	.0010-.0016	⊖	.015	.9272	1.999-2.000	.0007-.0028	⊖	⊖	5	.003-.011
8-348	1962-65	.0010-.0016	.015	.015	.9896	2.199-2.200	.0007-.0028	2.498-2.499	.001-.003	5	.006-.016
8-350	1969	.0010-.0016	.013	.015	.9272	2.099-2.100	.0007-.0028	⊖	⊖	5	.003-.011
8-350	1970-73	.0012-.0022	.010	.015	.9272	2.199-2.200	.0007-.0028	⊖	⊖	5	.002-.006
8-350	1973	.0007-.0013	.010	.015	.9272	2.099-2.100	.0013-.0015	⊖	⊖	5	.002-.006
8-350	1974-76	.0007-.0013	⊖	.015	.9272	2.199-2.200	.0013-.0015	⊖	⊖	5	.002-.006
8-366	1966-68	.0010-.0016	.010	.010	.9896	2.199-2.200	.0007-.0028	2.747-2.749	.004 Max.	5	.006-.010
8-366	1969-73	.003-.004	.010	.010	.9896	2.199-2.200	.0014-.003	⊖	⊖	5	.006-.010
8-396	1966-69	.0007-.0013	.010	.010	.9896	2.199-2.200	.0007-.0028	2.747-2.749	.004 Max.	5	.006-.010
8-396	1970-71	.0018-.0026	.010	.010	.9896	2.199-2.200	.0009-.0025	⊖	⊖	5	.006-.010
8-400	1975	.0014-.0020	.010	.015	.9272	2.099-2.100	.0013-.0015	⊖	⊖	5	.006-.010
V8-402	1970-72	.0018-.0026	.010	.015	.9897	2.199-2.200	.0009-.0030	—	⊖	5	.006-.010
8-427	1968	.0010-.0016	.010	.010	.9896	2.199-2.200	.0007-.0028	2.747-2.749	.004 Max.	5	.006-.010
8-427	1969-73	.0034-.0044	.010	.010	.9896	2.199-2.200	.0014-.003	⊖	⊖	5	.006-.010
V8-454	1970-72	.0024-.0034	.010	.015	.9897	2.199-2.200	.0009-.0025	⊖	⊖	5	.006-.010
8-454	1973-76	.0018-.0028	.010	.010	.9897	2.1983-2.1993	.0009-.0023	⊖	⊖	5	.006-.010
V6-401	1970-72	.0033-.0039	⊖	—	1.2399	2.8112-2.8122	.0010-.0031	⊖	.0013-.0039	—	.003-.008
V6-478	1970-72	.0039-.0045	⊖	.024	1.2399	2.8112-2.8122	.0010-.0031	⊖	.0013-.0039	—	.003-.008

⊖—Fit rings in tapered bores to the clearance listed in tightest portion of ring travel.

⊖—No. 1, 2.6835-2.6845; No. 2, 2.7145-2.7155.

No. 3, 2.7435-2.7465; No. 4, 2.7765-2.7775.

⊖—Rear bearing .0018-.0034; all others .0008-.0034.

⊖—Top ring .015; second ring .010.

⊖—Rear bearing .0008-.0024; all others .0003-.0019.

⊖—Rear 2.4479-2.4488; all others 2.4484-2.4493.

⊖—Rear .001-.006; all others .0003-.0024.

⊖—Top ring .010; second ring .013.

⊖—Front .0003-.0015; rear .0008-.0023; all others .0006-.0018.

⊖—Rear 2.7473-2.7483; all others 2.7481-2.7490.

⊖—Rear .0029-.0045; all others .0013-.0025.

⊖—Nos. 1 & 2, 2.7497-2.7496; Nos. 3 & 4, 2.7481-2.7490; No. 5, 2.7478-2.7488.

⊖—No. 1, .0007-.0019; No. 3, .0024-.004; All others, .0013-.0025.

⊖—No. 1, 2.7405-2.7495; Nos. 2, 3, 4, 2.7481; No. 5, 2.7478-2.7488.

⊖—Nos. 1, 2, 3, 4, .0013-.0025; No. 5, .0024-.0040.

⊖—No. 1, 2, 3, 4, 2.4484-2.4493; No. 5, 2.4479-2.4488.

⊖—No. 1, .0008-.0020; No. 2, 3, 4, .0011-.0023; No. 5, .0017-.0033.

⊖—Top ring .029; second and third rings, .020.

⊖—Top ring .031; second and third rings, .023.

⊖—All eng. rear, 3.1247-3.1237; rear, 3.1239-3.1229.

⊖—No. 1, 2.7485-2.7494; Nos. 2, 3, 4, 2.7481-2.7490; No. 5, 2.7478-2.7488.

⊖—Top ring .015, second ring .009.

⊖—No. 1, .0003-.0020; all others .0003-.0027.

⊖—No. 1, 2, 3, 4, 2.6484-2.6493; No. 5, 2.6479-2.6488.

- I. JOB TITLE: Brake Drum Wear
- II. JOB DESCRIPTION: Measuring brake from wear and calculating amount to be ground.
- III. INFORMATION NEEDED: Brake drum wear must be calculated accurately in order to machine (refinish) a drum to the proper size. The amount of metal that can be removed by a mechanic from a brake drum is subject to state law that says no more than .060 (sixty thousandths) may be machined from a brake drum.
- Be familiar with a drum wear gauge. Know how to use the drum caliper. Review subtraction of decimals.
- IV. MATERIALS NEEDED: Worn brake drum; drum calipers; pencil; work sheet T-6.
- V. TASK: Complete work sheet T-6
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$2.40
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Addition of Decimals
2. Subtraction of Decimals
- B. S.R.A. Kit
- C. Drum wear gauge
- D. Work sheet T-6

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-6

NAME _____ CLUSTER _____ DATE _____

1. Find the original size of the worn drum. It is stamped on the side of the rim.

2. Measure the drum at the deepest grove (worn spot.)

3. How much metal must be removed to machine and reuse this drum.

4. Is this amount within state law?

- I. JOB TITLE: The Micrometer
- II. JOB DESCRIPTION: Reading the micrometer accurately.
- III. INFORMATION NEEDED: The correct use of the micrometer is very important to the mechanical tradesperson. Accurate measurement will insure the job will be done correctly.
- IV. MATERIALS NEEDED:
1. Bergwald Filmstrip and Cassette #2, #3
(Measuring Tools Explained)
 2. Filmstrip projector and cassette player
 3. Micrometer
 4. Dime
 5. Engine Valve
 6. Work Sheet T-7
 7. Pencil
- V. TASK: Look at the filmstrip and listen to the cassette. Hold the micrometer in your hand as you do. Stop the filmstrip if you have a question. Complete work sheet T-7.
- VI. QUALITY CONTROL: Have supervisor check the work sheet
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
- A. Color Sound - Filmstrips
 1. The outside micrometer
 2. The inside micrometer
 - B. Diesel Mechanics - Schultz
 1. Measuring tools - pg. 371
 - C. S.R.A. Kit
 - D. Work sheet T-7

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-7

NAME _____ CLUSTER _____ DATE _____

Using the micrometer, measure:

1. The thickness of the dime _____.
2. The diameter of the dime _____.
3. The diameter of the valve stem _____.

- I. JOB TITLE: Axle Weight
- II. JOB DESCRIPTION: Calculating axle weight to meet state restrictions.
- III. INFORMATION NEEDED:

All states have laws regarding how much weight can be hauled in trucks on state roads. This is done to prevent damage to roads from too much weight crushing the road surface. Usually the weight that is allowed is calculated as axle weight: that is, how much of the vehicle's total weight is divided up between the sets of wheels.

- IV. MATERIALS NEEDED: Work sheet T-8; pencil
- V. TASK: Complete work sheet T-8
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$3.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:

A. Stein's Refresher Mathematics

- 1. Measure of weight - pg. 400

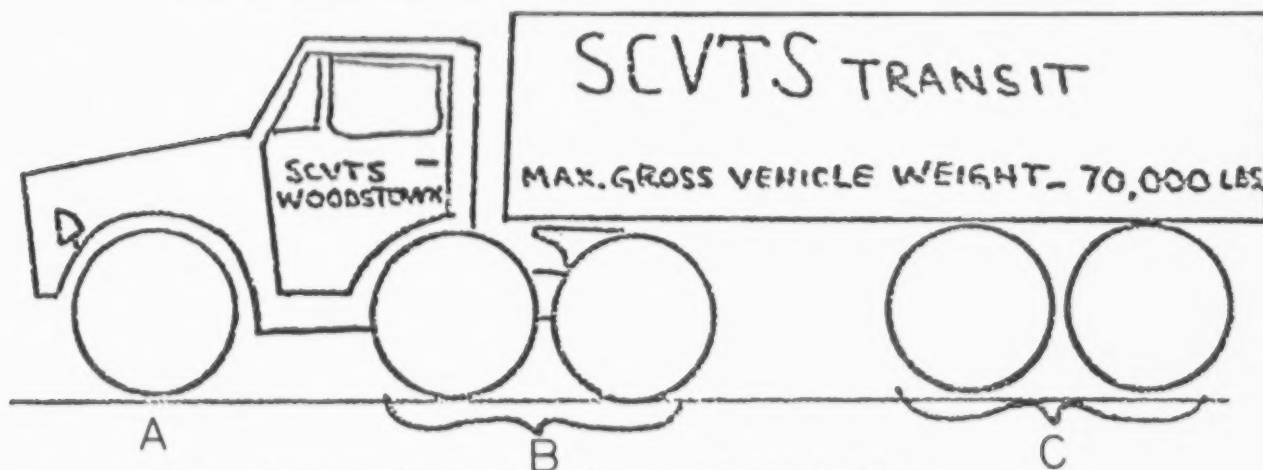
B. S.R.A. Kit

C. Work sheet T-8

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-8

NAME _____ CLUSTER _____ DATE _____



- I. Look at the drawing above. It has 5 axles:

The steering axle (a)
The driving axles (b)
The trailer axles (c)

Maximum total axle weight allowed is 70,000 pounds.

- II. If the steering axle has 6,000 pounds loaded on it, how much is left for the rest of the axles? _____
- III. If that weight were equally divided between the remaining axle, how much would each axle weigh? _____
- IV. The truck is weighed at an axle scale. The steering axle weighs 6,700 pounds, the driving axles weigh 17,500 pounds together, and the trailer axles weigh 16,520 pounds together. What is the total weight? _____
- V. Using your answer to #4, tell how much weight was loaded into the trailer if the tractor weighs 14,250 pounds empty and the trailer weighs 15,380 pounds empty. This answer is called the "payload". _____
- VI. Some states with a 70,000 pound total or gross weight limit law, allow 5% more to be added. What could the vehicle weigh if this 5% were added to the 70,000 pound maximum. _____

- I. JOB TITLE: Operating Costs
- II. JOB DESCRIPTION: Figuring fuel mileage, fuel costs and rate of income.
- III. INFORMATION NEEDED: Become familiar with the information printed in the Caterpillar Road Report, February 1976

Know how to:

Divide and subtract whole numbers
Multiply decimals by whole numbers
Round off to next highest whole number

- IV. MATERIALS NEEDED:

Road Report, February 1976 (T-9A)

Work sheet T-9B, pencil

- V. TASK: Complete work sheet T-9B
- VI. QUALITY CONTROL: Have supervisor check your work
- VII. PAY: \$3.60
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

A. Stein's Refresher Mathematics - 18

1. Reading & writing numerals naming whole numbers.
2. Rounding whole numbers
3. Addition of whole numbers
4. Subtraction of whole numbers
5. Multiplication of whole numbers
6. Division of whole numbers
7. Rounding of whole numbers

B. S.R.A. Kit

C. Work sheet T-9A, T-9B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-9A

NAME _____ CLUSTER _____ DATE _____

CATERPILLAR

An Engine Case History

February 1976

RELIABILITY PLUS POWER
FOR K.B. COMPANY, INC.

Hauling produce weekly from the East Coast to the West demands the dependability and reliability of a proven heavy-duty diesel. Caterpillar's 3406 PC-TA, 360 hp, Diesel Engine is the answer for the K. B. Company, Inc., Winston Salem, North Carolina.

Mr. Frank Childress, who drives for the K. B. Company, Inc., has driven 127,000 trouble-free miles in just eight months. He travels from North Carolina through New York to the Los Angeles area and then back to Winston Salem in one week. This requires favorable fuel economy, gradeability, and power to achieve a profitable and safe trip. The Caterpillar 3406 in his Peterbilt does just that. He averages 5.0 mpg with his 3406-360.

Mr. W. L. Kyle, president of K. B. Company, Inc., states that his 3406 PC-TA "goes as fast uphill as it does downhill." It performs just like his former engine a Caterpillar 1693 which accumulated 400,000 miles before overhaul. Although Mr. Kyle was skeptical of the 3406 Truck Engine when purchasing this new truck, he is now convinced that the 3406 Engine is every bit the performer of his previous 1693.

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-9B

NAME _____ CLUSTER _____ DATE _____

1. Mr. Childress has driven 127,000 miles in 8 months. How many miles does he drive in one month? _____

He makes 4 trips each month, how many miles does he drive on each trip? _____ (round off to the next highest mile).

2. The truck averages 5.0 m.p.g. (miles per gallon of fuel). How many gallons of fuel has it used since K.B. Company started using the truck? _____

How much fuel does it use on one trip? _____ (round off to the next highest gallon)

If fuel costs 56.9 cents per gallon, how much does fuel cost per trip? _____

3. On the back of the report it tells that this truck can operate at 80,000 pounds G.C.W. (gross combination weight) - that is, the total weight of the truck and the trailer. If the truck weighs 17,620 pounds empty, and the trailer weighs 17,260 pounds empty, what is the payload (amount of produce that can be loaded) of this truck? _____

4. A crate of lettuce weighs 40 pounds. How many crates can be loaded to fill the trailer to its maximum capacity? _____

5. The trip is paid at the rate of \$2.20 per crate. How much will the truck earn each trip if the maximum number of crates are carried? _____

- I. JOB TITLE: Mixing Paint
- II. JOB DESCRIPTION: Finding the correct proportion of paint to reducer.
- III. INFORMATION NEEDED: Reducer is used to thin out paint. Each paint is different so you have to find the correct percent of reducer to use with each one by reading the part of the label marked reduction.

EXAMPLE: Glo-More Paint

1. Reduce Glo-More paint with 75% Glo-Spray Reducer. If you have 1 gallon of paint, how much reducer will you need?

$$75\% = .75 = \frac{3}{4}$$

Since 1 gallon equals 4 quarts, $\frac{3}{4}$ of 4 = 3 quarts, you will need 3 quarts of reducer.

2. Reduce Glo-More lacquer with 150% reducer to get 5 gallons all together. How much paint and lacquer will you need?

$$150\% - 1.50 = 1\frac{1}{2}$$

For every gallon of paint you need $1\frac{1}{2}$ gallons of reducer. That makes $1 + 1\frac{1}{2}$ of reduced paint.

$$2\frac{1}{2} + 2\frac{1}{2} = 5$$

So you need 2 gallons of paint and 3 gallons of reducer.

$$1 + 1 = 2$$

$$1\frac{1}{2} = 1\frac{1}{2} = 3$$

- IV. MATERIALS NEEDED: Work sheets T-10A, T-10B, T-10C; pencil
- V. TASK: Complete work sheet T-10A, T-10B, T-10C
- VI. QUALITY CONTROL: Take worksheets to supervisor to be checked
- VII PAY: \$4.80

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES

- A. Stein's Refresher Mathematics - pg. 220

1. Changing decimals to percents
2. Changing percents to decimals

- B. S.R.A. Kit

- C. Work sheets T-10-A and T-10-B

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-10A

NAME _____ CLUSTER _____ DATE _____

TASK: Delux Enamel

DIRECTIONS FOR USE

Stir Thoroughly To Secure Uniform Mixture

REDUCTION: Reduce DULUX Enamel colors with approximately 25% DuPont Enamel Reducer. The following reducers are recommended for different shop temperatures:

Below 70°F - 8508S Speedy Dryer Reducer

From 70°F to 85 F Vari-Temp or 38125 Fast Dry Reducer

Above 85°F - 85225 Even-Flow Reducer

In very hot weather ad 7007S Fast Dry and Anti-Wrinkle Agent to prevent the possibility of wrinkling.

Strain Reduced Material Prior To Application

APPLICATION: Non-Metallic DULUX Enamel: Spray a medium first coat. Allow to set-up and follow with a full second coat.

Metallic DULUX Enamel: Spray a full first coat. Allow to set-up and follow with a medium second coat.

Two Toning: Under normal drying conditions DULUX Enamel may be recoated after 6 to 8 hours drying time.

Look at the label and find where it gives directions for reduction.

- A. If you are using 1 gallon of paint:
1. How much reducer will you need? _____
 2. How many quarts of reduced paint will you have then? _____
- B. If you are using 8 quarts of paint:
1. How much reducer will you need? _____
 2. How many gallons of reduced paint will you have then? _____

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-10B

NAME _____ CLUSTER _____ DATE _____

TASK: Synthetic Primer Sealer

DIRECTIONS

PURPOSE: An extremely fast drying synthetic non-sanding primer-sealer for use either over bare steel or aluminum, or over old acrylic lacquer or enamel finishes when the top coat is to be Fleet-X enamel. Recommended as a sealer for lacquer primer-surfacer before applying enamel top coats. It has excellent adhesion and color holdout and dries quickly to provide a uniform surface for recoating with color coats within 30 minutes.

It should be used as a sealer when the topcoat is to be conventional lacquer or acrylic lacquer.

REDUCTION: Stir unreduced material thoroughly and reduce 100% (equal parts) with Acme 61 Fleet-X Reducer. Stir thoroughly again and strain with a regular cloth or metal strainer.

APPLICATION:

1. Wash surface to be refinished to remove all surface dirt.
2. Remove grease, wax, oil, tar, polish, and road scum with Acme 88 Klix Wax and Silicone Remover.
3. Clean and prepare all exposed bare metal with Acme 28 Metal Cleaner.
4. Adjust spray gun to 40 pounds air pressure, and spray on light wet coat, applying only enough KWIK-SLIK to cover solidly. 2-71

ACME QUALITY PAINTS Cleveland, Ohio 44101 - Made in U.S.A.

If you are using $1\frac{1}{2}$ gallons of primer sealer:

1. How much Acme 61 Fleet-X Reducer will you need?

2. How much reduced primer sealer will you have then?

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-10C

NAME _____ CLUSTER _____ DATE _____

TASK: Lacquer Paint

DIRECTIONS FOR USE-STIR THOROUGHLY TO SECURE UNIFORM MIXTURE

REDUCTION - Thin 125% with DuPont Lacquer Thinner. Range of reduction can be from 100% to 150% to meet varying application conditions.

APPLICATION - Spray three or four wet double coats, allowing each double coat to flash. For maximum gloss and leveling of overspray, mist-coat with a mixture of DuPont Retardet and Lacquer Thinner.

RUBBING - Allow panel repairs to air dry four hours, preferably overnight. To overall finishing allow at least overnight dry and preferably longer. Force drying panels for 15 minutes at 165° F or overall jobs for one hour at 165° F will provide satisfactory dry. Then process with DuPont Hand Rubbing or Machine Polishing Compound. Hand polish or dry-buff to improve lustre.

WAXING - Allow at least 60 days to harden before waxing.

- A. If you are using 4 gallons of lacquer paint, how much lacquer thinner should you use? _____
- B. If you want the paint as thin as possible, how much lacquer thinner should you use? _____
- C. How long should you let the paint dry before waxing?

TASK: Primer Sealer

REDUCTION:

Reduce 8 parts of Primer-Sealer with one part of 3312S Reducer. In warm weather, or on large jobs, 3832S Reducer may be substituted for 3812S to improve leveling and reduce overspray.

- A. If you are using 8 quarts of primer Sealer, how much reducer will you need? _____
- B. If you need 18 quarts of reduced primer sealer all together:
 - 1. How many quarts of primer sealer will you need?

 - 2. How many quarts of reducer will you need?

- I. JOB TITLE: Driving Time
- II. JOB DESCRIPTION: Keeping a Driver's Log Book
- III. INFORMATION NEEDED:

The professional driver must keep accurate time records so that she/he can be paid for his/her work and to insure that she/he does not drive more than 10 hours in a 24 hour period (Federal Law).

To compute average speed, you must divide the distance in miles by the time it took to cover the distance.

Example: Matt drove 365 miles in $8\frac{1}{2}$ hours

Divide 365 by $8\frac{1}{2}$

$$8\frac{1}{2} = 8.5$$

$$\begin{array}{r} 42.9 \\ 8.5 \overline{)365.00} \\ \underline{340} \\ 250 \\ \underline{170} \\ 800 \\ \underline{765} \end{array}$$

42.9 miles per hour

Round off to nearest mile =
43 miles per hour

- IV. MATERIALS NEEDED: Work sheets T-11A and T-11B; pencil
 - V. TASK: Complete work sheets T-11A and T-11B
 - VI. QUALITY CONTROL: Take work to supervisor to be checked
 - VII. PAY: \$4.80
 - VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:
- A. Stein's Refresher Mathematics
 - 1. Measure of speed
 - 2. Division of Decimals
 - 3. Rounding whole numbers
 - B. S.R.A. Kit
 - C. Work sheets T-11A & T-11B

WORK SHEET # T-11A

NAME	CLUSTER	DATE
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Form Approved, Budget Bureau No. 04-R2799
ORIGINAL - File each day at home terminal
DUPLICATE - Driver retains in his possession for one month

 Matt Stuland
 (DRIVER'S SIGNATURE IN FULL)
 NONE
 (NAME OF CO-DRIVERS)

RECAP	
A	Day: Mon. Today Total: Low 3
B	On Duty: Tues. Today Total: Low 3-4
70 HR/8 DAY DRIVERS	
A	Total: Mon. On Duty: Tues. Low: 7 Days. Inst: Today
B	Mon. Available: Tomorrow 78 hrs. Status: 4
C	Total: Mon. On Duty: Tues. Low: 7 Days. Inst: Today
80 HR/7 DAY DRIVERS	
A	Total: Mon. On Duty: Tues. Low: 7 Days. Inst: Today
B	Total: Mon. Available: Tomorrow 86 hrs. Status: 4
C	Total: Mon. On Duty: Tues. Low: 7 Days. Inst: Today

ARRIVED PITTSBURGH
TERMINAL 7:45 P.M.

FROM: WOODSTOWN, N.J. (Starting point or place) TO: PITTSBURGH, PENNA. (Destination or turn around point or place)

USE TIME STANDARD AT HOME TERMINAL

- Look at the log book page above. Note that the graph is 24 hours long. (1 day). Each hour is divided into 4 parts or quarter. (15 minutes)
1. How long did Matt drive before having breakfast? _____
 2. How long did it take to have the flat tire repaired?

 3. How long was Matt's supper break? _____
 4. How much time expired between the time Matt started driving after the flat tire and when he stopped for supper? _____
 5. If the tire hadn't gone flat, what time would Matt arrive in Pittsburgh? _____
 6. Matt actually drove the truck for $9\frac{1}{2}$ hours and covered 390 miles between Woodstown and Pittsburgh. What was his average speed?

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-11B

NAME _____ CLUSTER _____ DATE _____

FORM - MCS 19 - Prescribed by the U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION Rev. - 67

DRIVER'S DAILY LOG
(ONE CALENDAR DAY - 24 HOURS)

Form Approved, Budget Bureau No. 04-87299
ORIGINAL - File each day at home terminal
DUPLICATE - Driver retains in his possession for one month

(MONTH) (DAY) (YEAR) (TOTAL MILEAGE TODAY) I certify these entries are true and correct: VEHICLE NUMBERS - (SHOW EACH UNIT)

(TOTAL MILES DRIVING TODAY) (DRIVER'S SIGNATURE IN FULL)

(NAME OF CARRIER OR CARRIERS) (NAME OF CO-DRIVER)

(MAIN OFFICE ADDRESS) (HOME TERMINAL ADDRESS)

	MID-NIGHT	1	2	3	4	5	6	7	8	9	10	11	NOON	1	2	3	4	5	6	7	8	9	10	11	Total Hours
1: OFF DUTY																									
2: SLEEPER BERTH																									
3: DRIVING																									
4: ON DUTY (Not On Duty)																									

REMARKS

Shipping document, manifest number, or name of a shipper and commodity. Information required by Section 395.6(a).
Check the time and enter name of place you reported and where released from work and when and where each change of duty occurred. Explain excess hours - Section 395.6(a).

FROM: (Starting point or place) TO: (Destination or turn around point or place)
USE TIME STANDARD AT HOME TERMINAL

RECAP

70 HR/8 DAY DRIVERS

A. Total Hrs. On Duty - Last 7 Days, Incl. Today

B. Hrs. Available Tomorrow 70 Hrs. Minus A

C. Total Hrs. On Duty - Last 8 Days, Incl. Today

80 HR/7 DAY DRIVERS

A. Total Hrs. On Duty - Last 6 Days, Incl. Today

B. Total Hrs. Available Tomorrow 80 Hrs. Minus A

C. Total Hrs. On Duty - Last 7 Days, Incl. Today

- What was the average speed for his entire trip, including stops? _____
- Between his breakfast stop and the flat tire Matt covered 92 miles. What was his average speed for this distance? _____
- Make your own trip graph for a trip to Norfolk Virginia 325 miles. Include stops for breakfast, lunch, fuel, and dinner. Have the driving time equal exactly 9 hours.
What is the average speed for the trip? _____

- I. JOB TITLE: Engine Volume
- II. JOB DESCRIPTION: Computing the volumes of the cylinder
- III. INFORMATION NEEDED:
- Volume or displacement of engines is the term that tells knowledgeable people the merits of engine types and enables mechanics to identify certain engines.
- To determine the volume of a cylinder and therefore of an engine, become familiar with a piston, a liner assembly and the steel rule.
- IV. MATERIALS NEEDED: Piston; cylinder liner; steel rule; pencil; work sheet T-12
- V. TASK: Complete work sheet T-12
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. Stein's Refresher Mathematics
1. Practical Applications - measuring volume
pg. 385
- a. Rectangular solid - 385
 b. Cube - 386
 c. Right circular cylinder - 387
 d. Sphere - 388
 e. Right circular cone - 388
 f. Pyramid - 389
- B. Work sheet T-12

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-12

NAME _____ CLUSTER _____ DATE _____

1. Accurately measure bore (distance across) of liner. Write as a decimal number _____.
2. Measure stroke (distance from top ridge of liner to top of piston) Write as a decimal _____.
3. Check the accuracy of your measurements with your supervisor.
4. Compute the volume of the cylinder in cubic inches using this formula:

Volume = Area of bore x stroke

Area of bore - distance across (diameter)
x .785

Volume = .785 x diameter x stroke = _____

5. Compute displacement of a 6 cylinder engine if you know the displacement from one cylinder (answer to #4)
_____.

I. JOB TITLE: Flat Rate

II. JOB DESCRIPTION: Determining how much time a job will take and how much will be earned.

III. INFORMATION NEEDED:

Time is very important to the transportation industry. Vehicles must be kept running.

Some mechanics and body repair personnel are paid according to how much time a job should take rather than how much time it actually took. Being paid this way is called "flat rate".

Time guides give information about the flat rate for specific jobs. Times are given in hours and tenths of hours.

Example: Job 1.35-00 (Remove and Replace Main Bearings on 330 Series engine removed from frame) should take 2.5 hours.

1 hour = 60 minutes

1/10 of 60 minutes = 6 minutes

2.5 hours = 2 hours + 5 x 6 minutes = 2 hours and 30 minutes.

IV. MATERIALS NEEDED: Time Guides T-13A, T-13B, T-13C; work sheet T-13; pencil

V. TASK: Complete work sheet T-13

VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.

VII. PAY: \$3.60

Oper.No.	BASIC ENGINE	Series	Rem.	TRUCK			IND.	MAR.	NAME
				N	D	P/U			CLUSTER
1.20-00	Cylinder Head and/or Gasket - R & R								
	INCLUDES: R & R air cleaner, piping	220	3.0	.	.	4.0	4.8	5.4	
	(3.10-00) rocker cover (1.85-00) ex-	330	4.0	.	.	6.0	6.8	7.4	
	haust manifold (6.10-00) fuel filter	466	4.0	.	.	6.0	6.8	7.4	
	(2.33-00) torque head and set engine rpm.								
	COMBINATIONS								
1.20-01	Grind valves & seats (one cyl.)	ALL	.6	.	.	.	.	.	
1.20-02	Valve springs (head removed) R & R (one cyl.)	ALL	.3	.	.	.	.	.	
1.20.03	Head casting replace								
	INCLUDES: Transfer all parts from old head to new casting	220	2.5	.	.	.	.	.	
		330	3.5	.	.	.	.	.	
		466	3.5	.	.	.	.	.	
1.21-00	CYLINDER HEAD (Removed) Complete O/H								
	INCLUDES: Disassemble, clean parts, and pressure test (1.21-04) grind valves.	220	3.0	.	.	.	.	.	
		330	4.0	.	.	.	.	.	
		466	4.0	.	.	.	.	.	
	DOES NOT INCLUDE: Replace valve guides or fuel injector or sleeves.								
	COMBINATIONS								
1.21-01	Surface Grind Head	220	.8	.	.	.	.	.	
		330	1.0	.	.	.	.	.	
		466	1.0	.	.	.	.	.	
1.21-02	Injector Sleeve - R & R Each	ALL	.4	.	.	.	.	.	
1.21-03	Valve Guide - R & R One Cyl.	ALL	.2	.	.	.	.	.	
1.21-04	Pressure Test Head (Disassembled	220	1.2	.	.	.	.	.	
		330	1.5	.	.	.	.	.	
		466	1.5	.	.	.	.	.	
									DATE

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-13B

NAME _____ CLUSTER _____ DATE _____

Oper. No.	Tune-Up	Series	Rem.	Truck		P/U	Ind.	Mar.
				N	O			
14.00-00	Engine Tune-Up							
	INCLUDES: Warm Engine,	220	.8	-		1.0	1.2	1.2
	adjust valves, set max.	330	1.0	-		1.4	1.6	1.6
	no load & idle speed.	466	1.2	-		1.6	1.8	1.8

18SE37

B14-1

Sept. 1, 1972

I. JOB TITLE: Comparison Pricing

II. JOB DESCRIPTION:

Comparing the advantages of bulk purchasing verses the single purchase of tools using a calculator.

III. INFORMATION NEEDED:

A tradesperson's tools are as important as his/her hands. Without enough quality tools he/she will be unable to do his/her work.

Shortly you will need tools so that you may enter the world of work. The cost of these tools is important to you because you must earn enough to pay for them.

Look at the Snap-on Tools Catalog and the Net Price List. Be sure you understand how to read them.

Become familiar with the calculator. Know how to use it.

IV. MATERIALS NEEDED: Snap-on Tool Catalog; Net Price List; Work sheet T-14; pencil

V. TASK: Using a calculator, complete work sheet T-14

VI. QUALITY CONTROL: Take work sheet to supervisor to be checked.

VII. PAY: \$3.60

VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES:

A. Stein's Refresher Mathematics

1. Unit pricing - Determining The Better Buyer
Pg. - 550

B. S.R.A. Problem Solving Kit - for use with a calculator.

C. Work sheet T-14

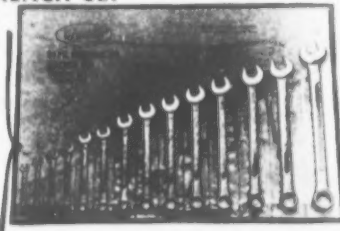
SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-14

NAME _____ CLUSTER _____ DATE _____

1. Look at the combination wrench set advertised below. Check the price for the set and record it here. _____
2. Notice that the wrenches in the set are listed individually. Look up the price of each one and record it below:

**14 PC. COMBINATION
WRENCH SET**



In tool roll. Nominal openings:

$\frac{3}{8}$ "	$\frac{11}{16}$ "	1"
$\frac{7}{16}$ "	$\frac{3}{4}$ "	$1\frac{1}{4}$ "
$\frac{1}{2}$ "	$1\frac{1}{16}$ "	$1\frac{1}{8}$ "
$\frac{9}{16}$ "	$\frac{7}{8}$ "	$1\frac{1}{2}$ "
$\frac{5}{8}$ "	$1\frac{3}{16}$ "	

Price \$79.00

**INDIVIDUAL COMBINATION
WRENCHES**

18-8536	1008	$\frac{1}{4}$ "	$3\frac{1}{8}$ "	\$ 2.20
18-8538	1010	$\frac{9}{16}$ "	$4\frac{1}{8}$ "	2.40
18-8540	1012	$\frac{3}{8}$ "	$4\frac{1}{2}$ "	2.80
18-8542	1014	$\frac{7}{16}$ "	$5\frac{1}{8}$ "	3.00
18-8544	1016	$\frac{1}{2}$ "	6"	3.20
18-8546	1018	$\frac{9}{16}$ "	$6\frac{1}{8}$ "	3.40
18-8548	1020	$\frac{5}{8}$ "	$7\frac{7}{8}$ "	3.80
18-8550	1022	$1\frac{1}{16}$ "	8 $\frac{1}{4}$ "	4.20
18-8552	1024	$\frac{3}{4}$ "	9 $\frac{1}{8}$ "	4.60
18-8554	1026	$1\frac{1}{8}$ "	10 $\frac{1}{16}$ "	5.10
18-8556	1028	$\frac{7}{8}$ "	11 $\frac{1}{8}$ "	6.20
18-8558	1030	$1\frac{1}{16}$ "	12 $\frac{3}{8}$ "	7.80
18-8560	1032	1"	12 $\frac{7}{8}$ "	8.00
18-8562	1034	$1\frac{1}{8}$ "	13 $\frac{3}{8}$ "	10.30
18-8564	1036	$1\frac{1}{4}$ "	14 $\frac{1}{8}$ "	12.00
18-8566	1040	$1\frac{3}{4}$ "	16 $\frac{1}{2}$ "	14.60

3. Add all the prices of the individual wrenches with a calculator. _____
4. Compare the price of the wrench set with the total price of the individual tools. How much will you save if you buy the set instead of the individual wrenches? _____
5. If you decide to buy the set and must borrow the money to pay for it, how much will the set cost if you must pay 9% interest on the borrowed money? _____

- I. JOB TITLE: Job Cost
- II. JOB DESCRIPTION: Determining Costs and Earnings of a job
- III. INFORMATION NEEDED:
- The repair order is the basis for being paid and telling if the company profited (made money) by doing the job
- Look at the repair order for South Jersey Engine Service. Notice many answers are blank. The columns marked C (cost) tell how much the material cost the company. S indicates money received from the sale of the repair. When both columns at the lower right are totaled and compared, the difference between the cost and the sale is the profit on the job.
- IV. MATERIALS NEEDED: Repair order for South Jersey Engine Service; work sheet T-15; pencil; calculator
- V. TASK: Complete work sheet T-15 using a calculator when necessary.
- VI. QUALITY CONTROL: Take work sheet to supervisor to be checked
- VII. PAY: \$4.80
- VIII. MATERIALS UTILIZED FOR LEARNING EXPERIENCES
- A. S.R.A. - Problem solving kit - for use with a calculator.
- B. Work sheet T-15

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION

WORK SHEET # T-15

NAME _____ CLUSTER _____ DATE _____

1. Add the hours in the labor charge column _____
2. If 36 quarts of oil cost \$30.60 how much does 1 quart cost? _____
3. The oil costs the company \$.45 per quart. What is the cost for 36 quarts? _____
4. The labor sale (to the customer) is \$1221.00. Take answer from #1 (total hours) and find how much one hour cost (the shop labor rate)? _____
5. The labor costs the company 50% of what they bill the customer. What is the labor cost for this job?
How much do they pay a mechanic for one hour's work? _____
6. Sublet repairs are jobs that must be sent to a machine shop to be done.
Total the sublet price column _____
7. Total the sublet cost column _____
8. Total the parts price column _____
9. Total the parts costs column _____
10. Add the sale column at the lower right of the repair order. _____ This is the subtotal.
11. Add the cost column at the lower right of the repair order. _____ This is the total cost of the job.
12. Add 5% sales tax to the subtotal (#10) _____
13. Add answer #10 (subtotal) and #12 (tax) _____ This is the total bill.
14. Notice that 6 cylinder kits are priced at \$634.80. How much would one cost the customer? _____
15. Compare the sale and cost columns at the lower right of the repair order. The difference tells how much profit the company made on the job. _____

16091 29-0902



ENGINE SERVICE

DEEPWATER TRUCK TERMINAL
R.D. PENNS GROVE, N.J. 08069DETROIT DIESEL ENGINE
AUTHORIZED SERVICE & REPAIRS
GENERAL TRUCK REPAIRS
EXPERT MAINT. TIECL. SERVICE
WELDING & FALCATION SERVICE
REPAIR FACTORY, U.
PULL PUMPS, WALL PUMPS,
BLOWING INJECTORS, ETC.
GUARANTEED HIGH WORK

2354

COST	QUAN.	NUMBER	DESCRIPTION	PRICE
85.50	1	50861	O.H. GSKT SET	109.60
519.00	6	911404	CYL KIT	634.80
69.04	1	401602	MAIN SET	89.10
30.00	6	201699	ROD BRG	42.72
33.00	3	911611	VALVE	42.33
24.12	12	912421	GUIDE	30.00
12.70	6	001461	INS. TUBE	18.00
76.26	1	211446	OIL PUMP	111.25
1.80	12	712412	NUT LOCK	2.40
5.80	4	401799	THRUST PL.	6.45
2.55	1	911629	MAIN SEAL	8.12
3.10	1	540 X	FUEL FILT.	4.01
3.75	1	132 W	L.O. FILT.	5.66
18.46	1	721602	F. RAIL	23.11
108.00	6	RECON.	INJECTOR	132.00
104.25	1	RECON.	PUMP	129.00
XXXX				XXXX
TOTAL PARTS →				⑧
⑨ TOTAL COST				

MAKE CUMMINS	TYPE OR MODEL H-6	YEAR '62	DATE 7-26-78
OWNER WRITTEN BY		PHONE NO. 769-0101	PROMISED 8-15-78
SPEEDOMETER 9306 HOURS		LICENSE NO.	PHONE WHEN HEAD YES ☒ NO ☐
Owner Name and Address X S.C.V.T.S. DEVELOPMENT INC.		Date Placed in Service X P.O. Box #350	
		WOODSTOWN, N.J. 08098	
Eng. No. NH-406419	Vehicle Ident. No. R.G. #3	X	
Trans. No.	Body No.		
Serial No. H-6	Color Code		
OPR. NO.	INSTRUCTIONS: MAJOR OVERHAUL POWER UNIT		
1.00-05	REMOVE AND REPLACE UNIT		
14.00-1	REWIRE MACHINE		
00-00	OVERHAUL POWER UNIT		
7.00-00	TUNE UP AND TEST RUN ENGINE		
① TOTAL HOURS			
④ ⑨ \$ PER HOUR			

ACCOUNT	AMOUNT	INT.	CUM.	C	S
24.00	1	SURFACE HEAD	32.00		
72.00	6	REBUILD RODS	96.00		
89.00	1	GRIND CRANKSHAFT	125.00		
③ 36 GAS, OIL & GREASE					
OILS, OIL @ ② 30.60					
LBS. GREASE @					
NOT RESPONSIBLE FOR LOSS OR DAMAGE TO CARS OR ARTICLES LEFT IN CARS IN CASE OF FIRE, THEFT OR ANY OTHER CAUSE BEYOND OUR CONTROL					
I hereby authorize the above repair work to be done along with the necessary material, and hereby grant you and/or your employees permission to operate the car or truck herein described on streets, highways or elsewhere for the purpose of testing and/or inspection. An express mechanic's lien is hereby acknowledged on above car or truck to secure the amount of repairs thereto.					
TOTAL COST				⑤	127.100
5% TAX				⑥	⑧
TOTAL				③	30.60
				⑦	⑥
				⑪	⑩
					⑫
					⑬

NAME

CLUSTER

DATE

WORK SHEET # T-15

SALEM COUNTY VOCATIONAL DEVELOPMENT CORPORATION